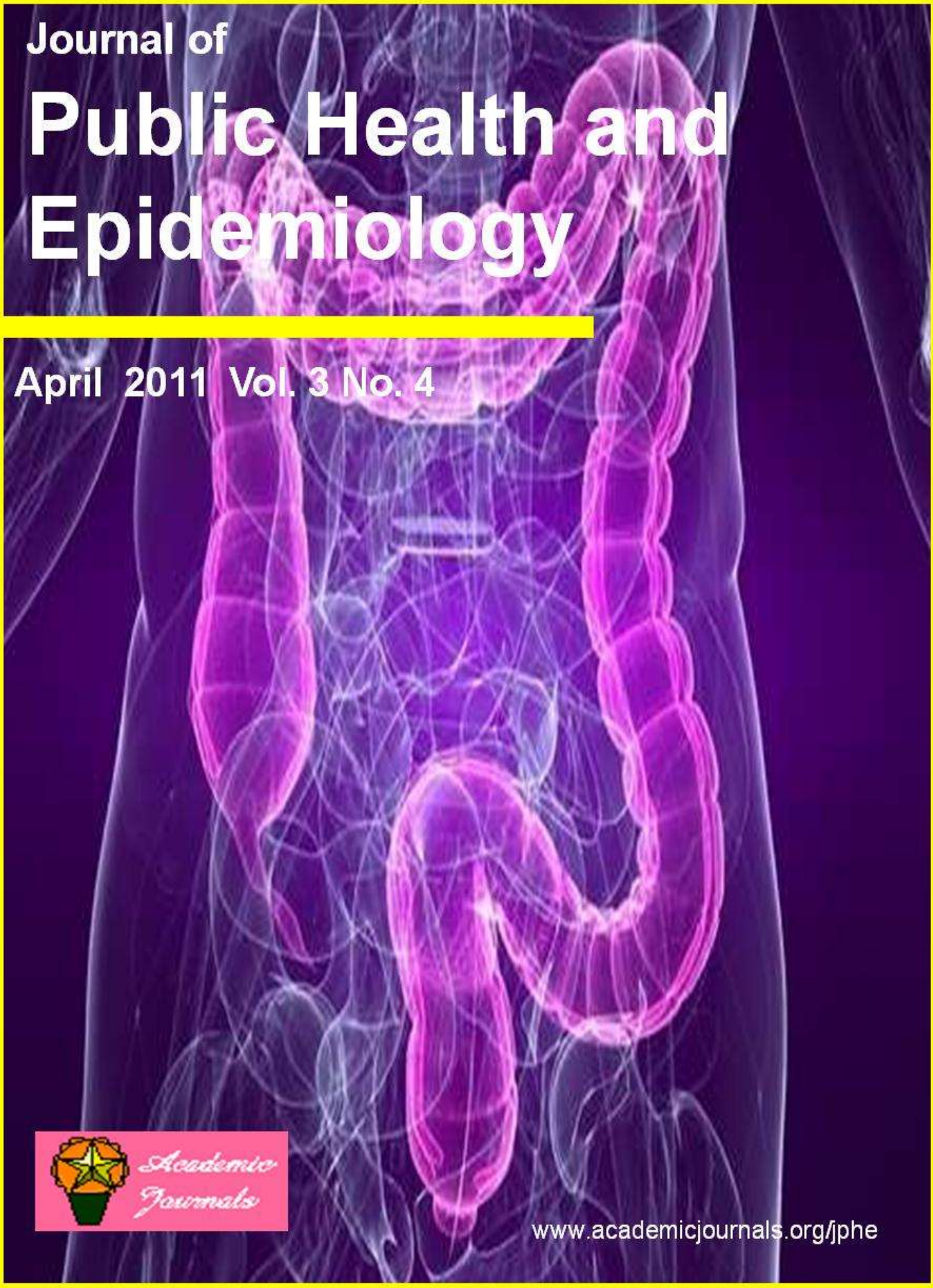

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Review

Modern practice in orthognathic and reconstructive surgery – Craniofacial distraction osteogenesis

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Distraction osteogenesis (DO) techniques have been widely accepted and practiced in orthopaedics, traumatology, and craniofacial surgery. Over the last two decades, using DO methods, many previously untreatable conditions have been successfully managed with outstanding clinical outcome. Although the mechanism of DO is still not fully understood, it is generally accepted that mechanical stimulation is the key in promoting and maintaining tissues' regenerating capacities. In the management of severe maxillomandibular deformities, orthognathic surgery produces less than optimum outcome with greater chances of relapse. Inadequate bone contact, insufficient fixation, stability and partial or total relapse due to excessive muscle stretching are often observed. To overcome these disadvantages a path breaking work in the field of distraction, osteogenesis occurred. The present article aims at highlighting the advantages of this newly developed technique over previous surgical remedies.

Key words: Distraction osteogenesis, orthopaedics, craniofacial surgery, orthognathic surgery.

INTRODUCTION

Although traditional orthognathic surgery and craniofacial reconstruction has gained generalized acceptance but it has its own limitations. Many congenital deformities require a large amount of skeletal movements and when acutely stretched, the surrounding soft tissues cannot adapt to their new position, resulting in regenerative changes, relapse, compromised function and aesthetics. Hence, in light to this, new approaches have been developed amongst which the most suitable alternative approach is "distraction osteogenesis." Distraction osteogenesis has revolutionized the management of several maxillomandibular deformities. In 1905, Codivilla introduced the limb lengthening procedure that had a high complication rate. Later in 1951, Dr. Gavrio Ilizarov did a path breaking work in the field of distraction osteogenesis for limb lengthening based on the biology of bone and surrounding tissues to regenerate under tension. Distraction osteogenesis is a surgical approach by which the development of new bone growth in an area subjected to gradual tension stress occurs by the deliberate separation of fragments by traction. Distraction forces applied to bone creates tension in the surrounding soft tissues, initiating a sequence of adaptive histological changes termed as "distraction histogenesis". In early nineties a miniaturized orthopaedic device was successfully used extraorally by McCarthy et al. (1992) in children with craniofacial anomalies.

In late nineties, Wangerin used the first intraoral titanium mandibular distraction device and later Dessner et al. (2001) demonstrated an intraoral, tooth borne distractor for lengthening the mandible. Rachmiel et al. (1993, 1996, 1999) also successfully performed the gradual advancement of midface with the use of distraction osteogenesis. Figueroa and Polly (1999) continued with the use of extraoral distraction device to

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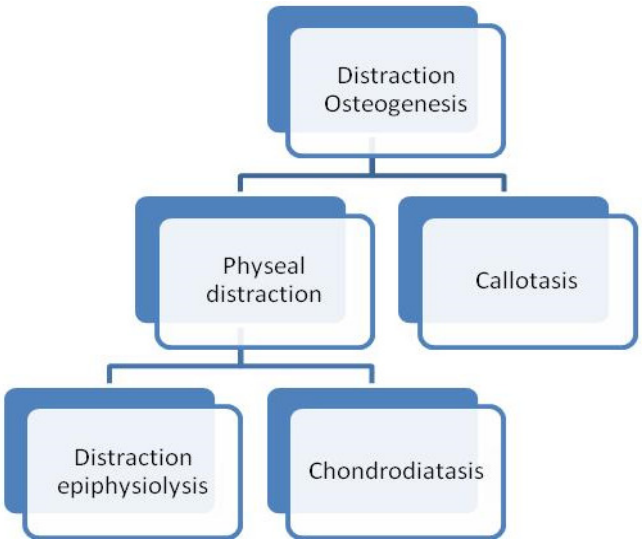

Figure 1. Classification of distraction.

distract the midface. The present article aims to highlight the clinical applications of reconstructive tissue engineering caused by distraction of bone for esthetic makeover of patients having severe dentofacial deformities.

CLASSIFICATION OF DISTRACTION OSTEOGENESIS

Depending upon the place where tensional stress was induced, the techniques are categorized in Figure 1 (De Bartiani et al., 1986).

Physeal distraction (Distraction of the bone growth plate)

Distraction epiphysiolysis

It involves the relatively rapid rate of bone segment separation, ranging from 1 to 1.5 mm/day. The increased tension between the growth plates produces fracture of the physis.

Chondrodiatasis

It utilizes a very slow rate of bone segment separation. It is generally less than 0.5 mm/day. Hence, growth plate is stretched without fracture (Sledge et al., 1978; Aldegheri et al., 1989).

The physeal distraction technique has certain disadvantages like difficulty in fixation of a very short epiphyseal segment and the physis frequently gets damaged resulting in premature cessation of growth (Peltonen et al., 1984; De Pablos et al., (1990).

Callotasis (Distraction of the fractured callus)

Callotasis is derived from two words: the Latin name callum (scar tissue between the bone segments) and the ancient Greek noun taois (tension or extension). It is the gradual stretching of the reparative callus forming around bone segments interrupted by osteotomy or fracture (Figure 5) (Ilizarov, 1989; Al-Aqs et al., 2008).

Therefore, callotasis is the preferred form for distraction osteogenesis. Clinically, callotasis consists of five sequential periods and these are: 1) osteotomy, 2) Latency, 3) Distraction, 4) Consolidation and 5) Remodelling.

1) Osteotomy is the surgical separation of a bone into two segments.
2) Latency is the period from bone division to the onset of traction and represents the time required for reparative formation between the osteotomized bone segments.
3) Distraction period is that time when a traction force is applied to bone segments and a new bone is formed within intersegmentary gap. The rate and rhythm of distraction are the two important parameters during this period. Rate represents the total amount of bone segment movement per day. Rhythm is the number of movements per day into which rate of distraction is divided.
4) Cosolidation period allows mineralization and corticalization of the newly formed bone tissue prior to device removal.
5) Remodelling is the last clinical phase that takes place after removal of the distraction device. This period prolongs for approximately 1 year after completion of distraction.

HISTOLOGICAL ASPECT OF DISTRACTION OSTEOGENESIS

The clinical stages of distraction osteogenesis have a histological aspect also in Figure 6 (Ilizarov, 1989; Komuro et al., 1994; Aronson et al., 1990, 1997; Al-Aqs et al., 2008).

Osteotomy

As the bone is fractured and divided into two segments, the discontinuity triggers the process of bone repair called fracture healing. Firstly, recruitment of osteoprogenitor cells occurs, followed by cellular modulation or osteoinduction and establishment of an environmental template called osteoconduction. So, a reparative callus is formed within and around the ends of the fractured bone segments. Later the callus undergoes replacement by lamellar bone which is more mechanically resistant.

Latency period

a) The inflammatory stage lasts for 1 to 3 days. Vascular disruption gives rise to haematoma which is converted to a clot and bony necrosis occurs at the end of the fractured segments. The clot is replaced lastly by granulation tissue consisting of inflammatory cells, fibroblasts, collagen and invading capillaries.
b) At the end of the latency period, 5 days following osteotomy and just before commencement of distraction, only a mesh of fibrin clot containing blood cells and newly formed capillaries are observed.
c) Soft callus stage lasts for approximately 3 weeks following the inflammatory stage. Continuation of in growth of capillaries takes place and the granulation tissue is converted to fibrous tissue by fibroblasts. Cartilage replaces the granulation tissue, more towards the periphery of the intersegmentary gap than in the central region. Cartilage provides a suitable material that is less demanding of oxygen, which temporarily bridges the gap until blood supply catches up.

Distraction period

During osteodistraction, the normal fracture healing is interrupted by the application of gradual traction to the soft callus. The growth stimulating effect of tension activates the biologic elements of the intersegmentary connective tissue. This causes the prolongation of angio-genesis with increased tissue oxygenation and increased fibroblast proliferation with intensification of biosynthetic activity. As distraction begins the fibrous tissue of the soft callus becomes longitudinally oriented along the long axis of the callus. Between third and seventh days of distraction the capillaries grow into the fibrous tissues, thereby extending the vascular network. During the second week the osteoblasts starts laying down the osteoid tissue on these collagen fibres. Bone formation thus occurs along the vector of tension and is maintained by the growing apexes, known as “growth zone.”

Consolidation period

After 10 days of distraction (nearly 15 days post osteotomy), 3 distinct zones and two transitional areas within regenerative tissue could be observed.

a) Histologically the first region to appear is the mid region called as central zone (CZ) in which the tissue is composed of mesenchyme-like and spindle shaped cells in which many capillaries are dispersed. So, it is called as “mesenchymal or proliferative area.”
b) On both the sides of central zone are the paracentral zones (PCZ) in which number of cells and capillaries are decreased gradually accompanied with intercellular matrix mainly consisting of collagen fibres. So,it is called as “fibroblastic or collagenous area.”
c) Most proximally and distally are the proximal distal zones (PDZ) which are in direct continuation with old bony edges. Woven bone trabeculae are observed and hence it is called as “trabecular or mineralizaion area.”

The tips of the trabecular area recruit pre osteoblasts from the collagen ridge distracted tissue. These are arranged concentrically around the tips of trabeculae and have high proliferation index. Then these preosteoblast further mature into osteoblast contributing to the trabecular growth so it is a transition period of the distraction zone. After completion of this period (nearly after 15 days of distraction) a homogenous zone is again observed and the trabeculae gradually become mineralized in the newly formed woven bone.

Remodeling period

After 6 weeks of consolidation there is no zonation as it was during active lengthening. The bony trabeculae becomes thicker with a mixture of lamellar and woven bone, rimmed by osteoblast and bridging the distracted gap from edge to edge. Bone remodeling of newly formed bone by osteoclastic resorption is also identified histologically thereby completing the whole process. Thus, it takes a year or more before the structure of newly formed bone tissue matures.

CLASSIFICATION OF DISTRACTION DEVICES ACCORDING TO THE POSITION WHERE THEY ARE PLACED

Based on distraction device used

In general two types of devices have been used for craniofacial osteodistraction (Figure 2) (Samchukov et al., 1998):

Internal distractors

i) They are placed either submucosally or extra mucosal.
ii) They may be tooth borne, bone borne, or hybrid.
iii) Advantage - they do not produce facial scarring.
iv) Most commonly used intraoral titanium mandibular distraction device (Guerrero et al., 1997) (Figure 7).
v) Modular internal distracters - used for midface advancement.
vi) Customized tooth-borne distracters-they can be designed and fabricated by the orthodontist for maxillomandibular alveolus distraction in the transverse

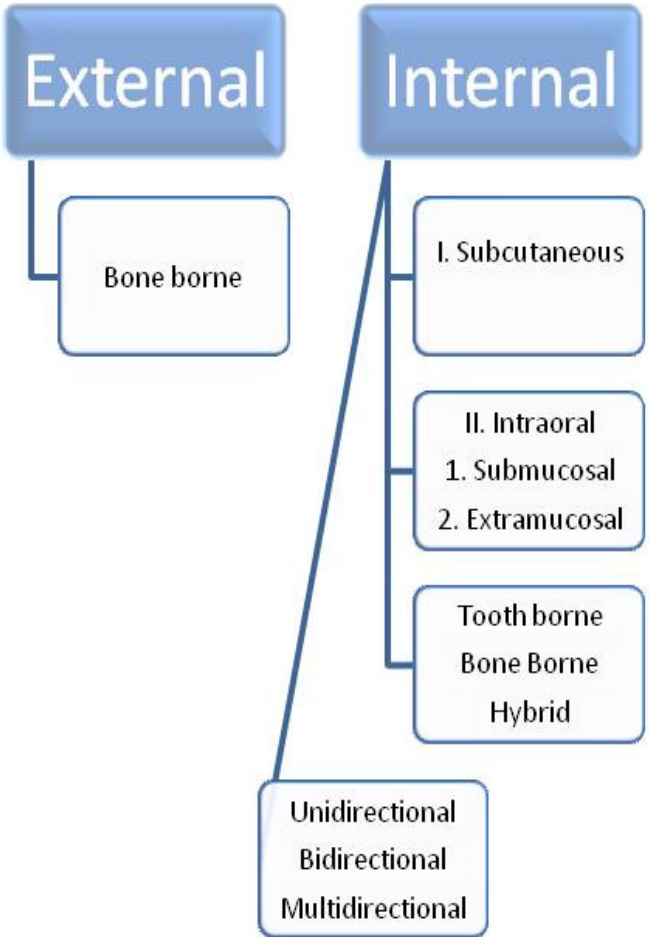

Figure 2. Classification of craniofacial distraction devices.

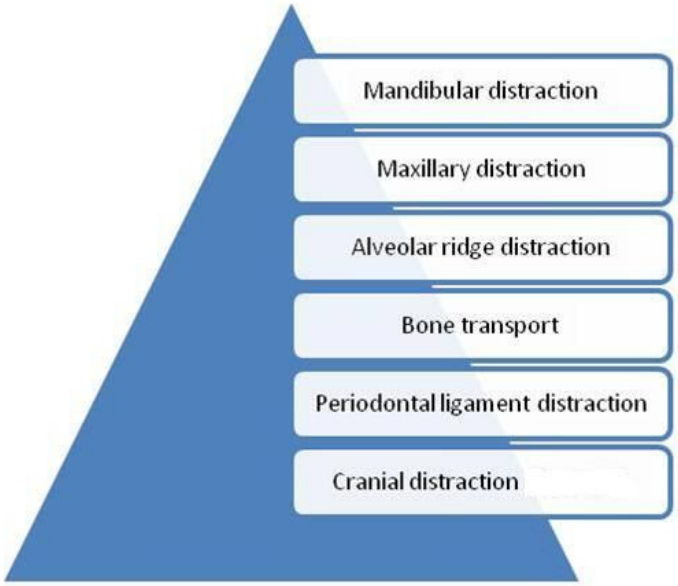

Figure 3. Classification of craniofacial distraction according to sites.

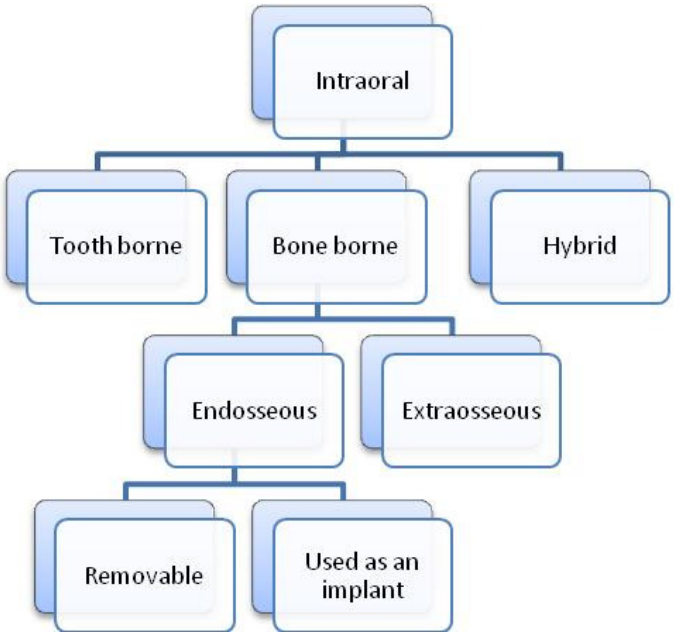

Figure 4. Alveolar ridge distraction devices.

plane.

External distractors

i) They are placed using bone pins.
ii) Much easier to place and simpler to replace during distraction if necessary or to remove at the completion of bone lengthening.
iii) Disadvantages - include skin scarring and poor acceptance by the patients (Figure 8) (Figuora and Polley, 1999).

Based on site at which it is placed

1. Mandibular distraction (Figure 3 and 9)
2. Midface/maxillary distraction (Figure 10)
3. Alveolar distraction (Figure 4).
4. Bone transport.
5. Internal distractor for craniofacial synostosis (rigid external distractor (RED) (Figure 11) (Samchukov et al., 1999).

Based on the plane in which the device works

Uniplaner and multiplaner devices

i) Uniplaner devices accomplish the distraction in a single direction.
ii) Multiplaner devices permit distraction in more than one

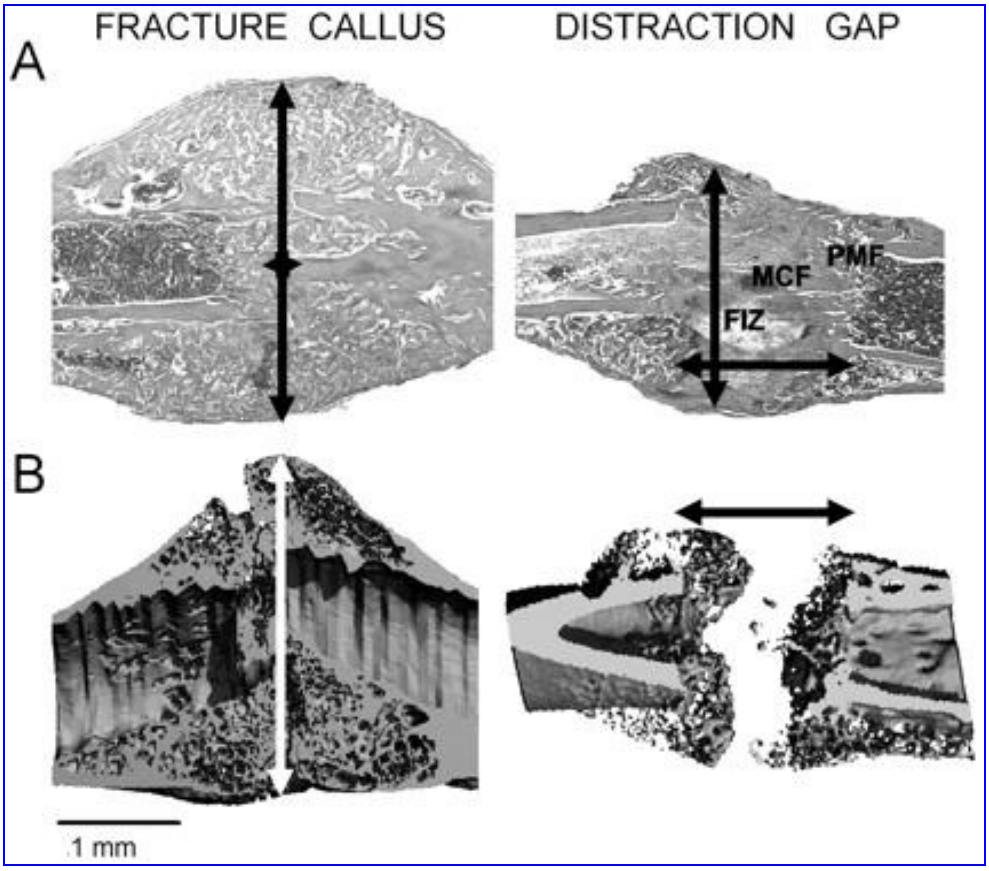

Figure 5. Comparisons of the tissue histology and mineralized tissue structure of fracture callus and distraction gap tissues. Murine femur fracture calluses and tibia distraction gap tissue were prepared from specimens obtained 21 days post-fracture or at 21 days post-surgery. (Panel A) Representative longitudinal sections of fracture and distraction osteogenesis were stained with Safranin-O/fast green. Original magnification 25x. (Panel B) Representative longitudinal microCT images at a resolution of 12 microns. Arrows indicate the extent of new bone formation. Both sets of images are presented with the distal and proximal orientations, left to right. The various zones in distraction osteogenesis are indicated. The central fibrous zone, histologically called the fibrous interzone (FIZ), is rich in chondrocyte-like cells, fibroblasts, and oval cells that are morphologically intermediate between fibroblasts and chondrocytes. The "fibrous interzone" contains differentiating osteoblasts that deposit osteoid along collagen bundles. When these collagen bundles mineralize, they form a zone called the zone of micro column formation (MCF). In between the "fibrous interzone" and the zone of micro column formation is a zone of high cell density called the primary matrix or mineralization front (PMF). Separate scale bars for both the histological and microCT images are presented below each image (1 mm).

plane by means of separate distraction arm.

CLINICAL IMPLICATIONS OF DISTRACTION OSTEOGENESIS

Indications

Congenital deformities

i) Pierre-Robin syndrome. Distraction osteogenesis is required to prevent asphyxia and for correction of mandibular deficiency.
ii) Severe retrognathic syndromes which include Treacher Collins syndrome and Goldenhar syndrome.
iii) Severely constricted mandible in children and adults.
iv) Congenital micrognathia-non-syndromic.
v) Maxillary deficiency in operated cases of cleft lip and palate.
vi) Craniofacial microsomia-unilateral/bilateral.
vii) Midface hypoplasia.
viii) Obstructive sleep apnoea syndrome.
ix) Severely constricted maxilla in adults.
x) Facial asymmetry (Dale et al., 2007).

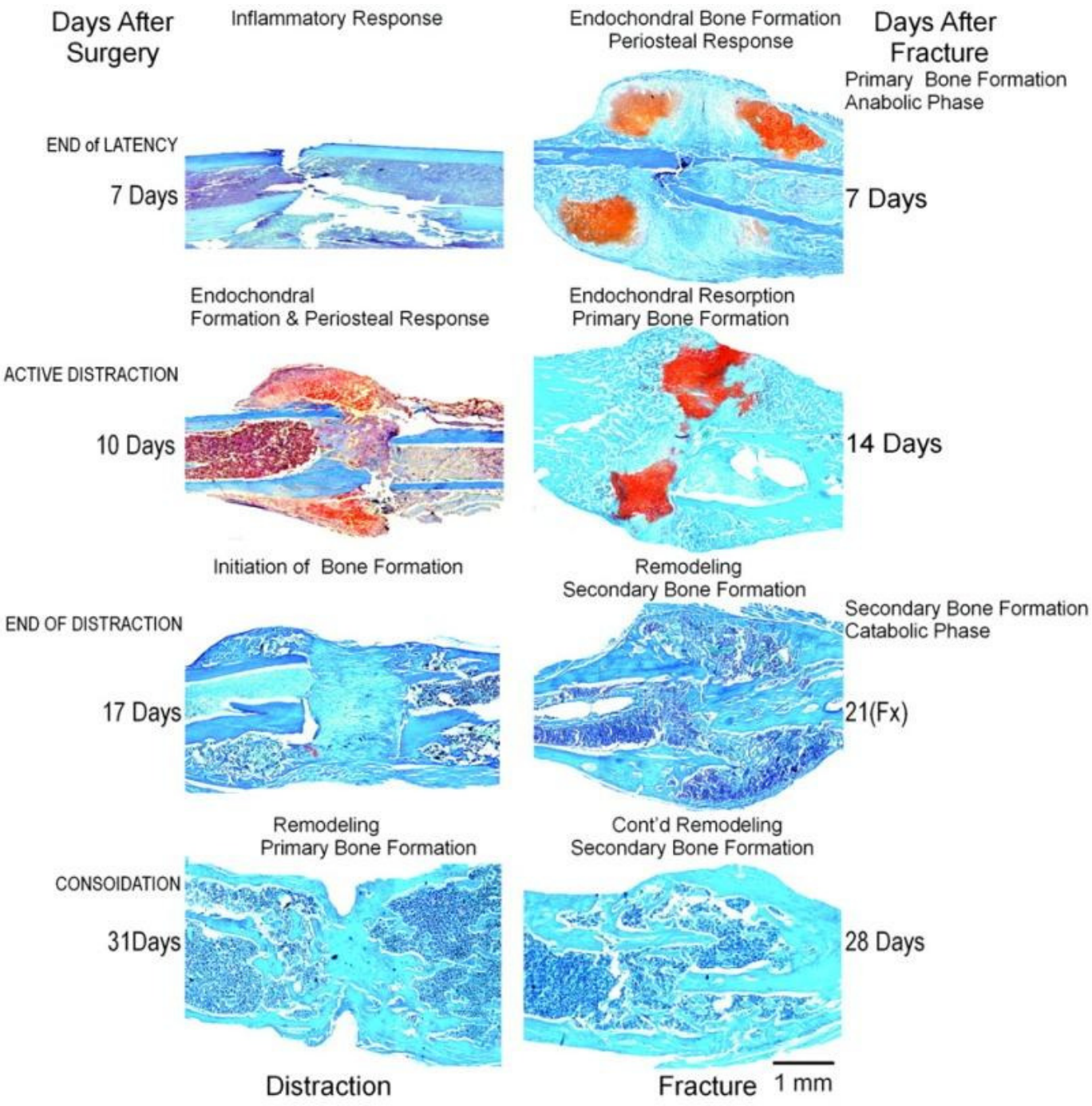

Figure 6. Histological aspect of distraction osteogenesis.

Acquired conditions

1. Post-traumatic growth disturbance of the mandible, for example mandibular hypoplasia due to TMJ ankylosis.
2. Non-union of fractures.
3. Atrophy of edentulous segments.
4. Oncologic mandibular osseous defects.

Miscellaneous

1. Rapid canine distraction.

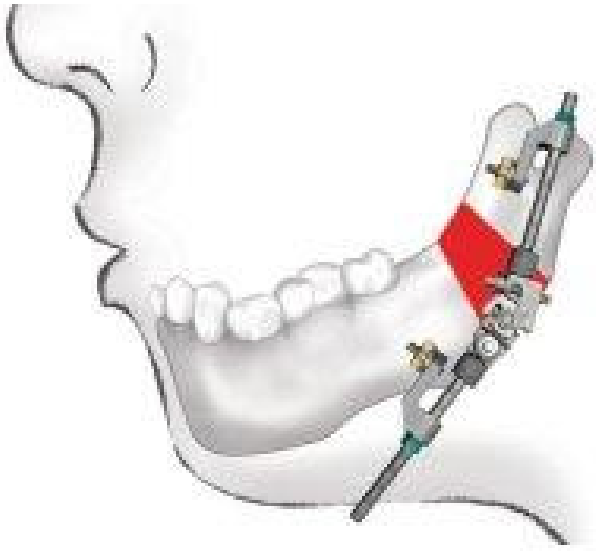

Figure 7. Intra-oral Zurich mandibular distractor (Product. Multivector distractor; http://us.synthes).

Figure 8. External midfacial distractor. (Product. External midface distractor; http://us.synthes).

2. Distraction for ankylosed teeth.

Contraindications

Relative contraindications are:

1. Poor nutrition and lack of soft tissue.
2. Inadequate bone stock as in neonates.

Figure 9. Mandibular distractor product. (Multivector mandibular distractor; http://us.synthes).

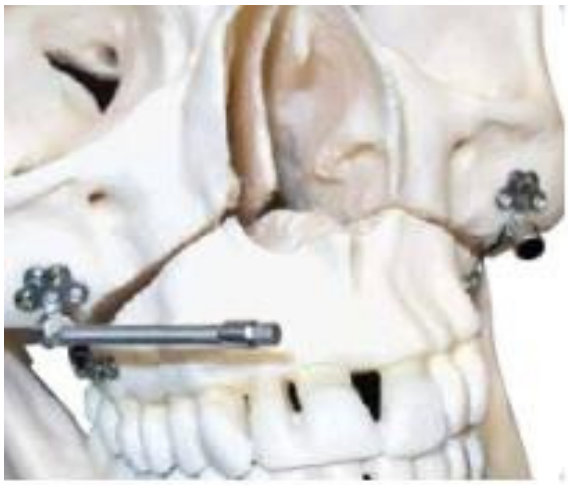

Figure 10. Midfacial distractor (multivector maxillary distractor http://us.synthes).

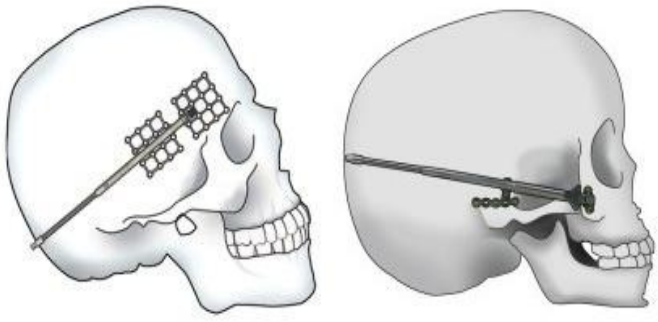

Figure 11. Modular internal distractor (cranial) (Product. Craniofacial Multivector distractor; http://us.synthes).

3. Geriatric patients due to increased number of mesenchymal stem cells.
4. Irradiated bone.
5. Osteoporotic bone.
6. Any systemic disease which affects bone metabolism.

Advantages of distraction osteogenesis over orthognathic surgery

1. The slow rate of bone formation allows histogenesis of the associated soft tissues and therefore less possibilities of relapse.
2. Shorter hospital stay.
3. Reduced postoperative pain and swelling.
4. Increased stability because soft tissues can adapt over longer period to the advanced maxillary /mandibular position (physiological remodeling).
5. Reduced inferior alveolar nerve dyaesthesia.
6. Reduced need for intermaxillary fixation.
7. Large maxillomandibular advancement is possible.
8. No bone graft is required unlike conventional orthognathic surgery thus eliminating donor site morbidity.
9. The new bone formed via distraction osteogenesis is more native.

Disadvantages

1. Multiple daily out patient visits may be required in some cases.
2. Poor 3D control on the segments with current distracters. The 3D distractors are being constantly modified for the desired results.
3. Manipulation of healing corticotomy daily or several times a day could give rise to pain.
4. Difficult plaque control.
5. Damage to TMJ due to incorrect vector orientation.

MANAGEMENT AND TREATMENT PLANNING PROTOCOLS

The following points should be considered while planning a case-

i) Records- complete records (pre, mid and post).
ii) Treatment planning sessions.
iii) When planning mandibular advancement: nature and type of advancement must be considered:

a) Unilateral vs. bilateral.
b) Vertical vs. horizontal vs. oblique.
c) Site of distraction: corpus vs. ramus.

iv) Maxillary advancement in hypoplasia: sagittal and sagittal combined with transverse.
v) Maxillary advancement in cleft lip and palate patients-velopharyngeal considerations/ speech considerations (AAO, 2000; Hanson et al., 1999; Hanson, 2001).

SURGICAL APPROACH

i) Transoral approach is preferred in maxillofacial distraction.
ii) Extraoral approach may be considered in special situations only.
iii) Device positioning – the device is placed along the desired vector of distraction. Templates based on standardized radiographs or steriolithiographs models can be useful guide for device orientation and osteotomy.

Osteotomy

Care should be taken not to disturb underlying teeth, roots, and neurovascular bundle.

a) For midface advancement, a high Le Fort 1 osteotomy is preferred. If transverse distraction is required a mid-palatal split is performed.
b) Device fixation - monocortical screws are used for fixation.
c) Initial/trail activation - the device is activated through 2 to 3 mm to verify the completion of osteotomy.
d) Closure - a water tight closure of surgical site is required to minimize chances of salivary contamination and subsequent infection.

Distraction protocol

i) Latency period recommended ranges from 5 to 10 days.
ii) Distraction is generally carried out at the rate of 1.0 mm/24 h.
iii) Surgeon and the orthodontist should monitor the patients progress clinically and radiologically.
iv) Consolidation phase ranges from 8 to 14 weeks.

Successful management of craniofacial deformities with distraction osteogenesis involves a team approach among various specialties of dentistry.

CONCLUSION

The application of distraction osteogenesis offers a novel solution for surgical orthodontic management of developmental anomalies of the craniofacial skeleton. Osteodistraction provides a means whereby bone may be molded in to different shapes to more adequately address

the nature of skeletal deformities and asymmetries. As clinicians begin applying this new technique, they will quickly realize that there is learning curve associated with distraction osteogenesis to treat deformities of the head and neck.

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Full Length Research Paper

Zoonotic helminth parasites in faecal samples of household dogs in Jimma Town, Ethiopia

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A cross sectional study was conducted in Jimma town from October 2009 to April 2010 to determine the occurrence and prevalence zoonotic gastrointestinal helminth parasites in household dogs. For the purpose, faecal samples from 334 dogs were collected and examined using faecal floatation and Mac-master egg counting parasitological tools. Among the animals examined, helminth parasite infection was detected in 215 (64.4%) dogs, and the species of helminth parasites found with their relative frequencies were: *Ancylostoma caninum* (58.8%), *Toxocara canis* (25.8%), *Dipylidium caninum* (25.8%), *Taenia* spp. (18.3%), *Toxocara leonina* (16.8%) and *Trichuris vulpis* (0.6%). There was a significant difference in the overall prevalence between adult and young animals (P < 0.05). The species specific prevalences similarly showed a significant variation between the two age groups, being high in young dogs. Both the overall and parasite specific prevalences were statistically insignificant between genders. The overall and parasites specific prevalence showed a decreasing trend as the host age increases. The overall mean faecal egg counts for *T. canis*, *T. leonina, A. caninum* and *D. caninum* were: 657.5 ± 76.4, 674.5 ± 96.2, 3368.2 ± 258.3 and 622.1 ± 51.8, respectively. In conclusion, the prevalence and intensity of gasterointestinal parasites were high; all of the parasites identified were potential public health risks. It implies the necessity of providing education to the public about the potential health risks associated with owning pet animals and how to prevent and minimizing the risk of acquiring helminth zoonotic parasites from dogs.

Key words: Zoonotic, helminth parasites, dog, faeces, Ethiopia.

INTRODUCTION

In Ethiopia dogs are important animals in many urban and rural households, contributing as house guards in the majority of the cases and pet animals. In spite of pet benefits to their owners, there are well documented health hazards associated with humans association with dogs. A number of infections, in particular parasitic diseases, capable of being transmitted from pets to human, had been reported and summarized by many authors (Schantz, 1994; Geffray, 1999; Plant et al., 1996; Robertson et al., 2000; Paul et al., 2009). Among the zoonotic parasites that have been widely studied and recognized as a significant public health problem world wide are the following helminth zoonotic parasites: *Taenia* spp./*Echinococcus* spp., *Toxocara canis*, *Dipylidium caninum* and *Ancylostoma* spp. These and others are important in developing countries; due to the presence of uncontrolled population of dogs exist in close proximity to increasing density of human population in both rural and urban environment (Dutta, 2002). Furthermore the level of hygienic conditions and the lack of veterinary attention and zoonotic disease awareness in those countries, exacerbate the transmission of these diseases (Schantz, 1991; Traub et al., 2002). To minimize the transmission of zoonotic parasite diseases, data must be collected on the prevalence of parasites and habits of dog owners. But in this regard there are only few published data available in central part of Ethiopia (Yacob et al., 2007; Endrias et al., 2010). Currently there are no data available on the zoonotic helminth parasites of household owned dogs in Jimma town, Southwest Ethiopia. Therefore this study was undertaken to determine the occurrence, prevalences and intensity of helminth zoonotic parasites in the

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faeces of household dogs in the Jimma town.

MATERIALS AND METHODS

Study area

The study was carried out from November, 2009 up to April 2010 in Jimma town, 346 km Southwest of Addis Ababa at latitude of about 7° 13' 8° 56' N and longitude of about 35°52 to 37°37' E, and at an elevation 1750 m above sea level The area receives a mean annual rainfall ranging from about 1420 to 1800 mm which comes from February to October. The annual mean temperature is ranging from 12.1 to 28°C. According to the 2007 national statistic authority data, the total human population is estimated at 174,446.

Collection of sample and parasitological procedures

The study animals were dogs owned by residents of Jimma town. The number of animals we planned to take samples was 382 by using sample size determination formula of Thursfield (1995), indicated below:

$N = 1.96^2 \times PQ/ D^2$

where N is the required sample size, P (52.9%) is expected prevalence based on previous study of Endrias et al. (2010) here in Ethiopia, Q is 1-P, D is the level of precision (5%) and 1.96 is to indicate 95% confidence level.

However we only manage to take feacal samples from 334 house hold dogs. To collect fecal sample households were selected randomly by lottery system. The faecal samples were collected directly from rectum of the dogs and fresh faecal material also collected were from the floors of cages or from ground (puppies), and then transferd in a labeled disposable container. Then the sample was transported to parasitology laboratory of Jimma University, College of agriculture and veterinary medicine, for further examination. In the laboratory faecal samples were assessed visually to check the presence of proglitids to categorize the sampled animal as *Taenia* species positive or negative then after samples were stored in a refrigerator at 4°C until processing. Each faecal sample was examined for helminth parasites eggs by the standard McMaster technique, using saturated sodium chloride as flotation solution. Each faecal sample was examined microscopically for parasite egg identification by using 100× magnification of light microscope. All helminth eggs were identified based on their morphological characteristic described by Thienpoint et al. (1998) and Taylor et al. (2007). Helminth egg count per gram (EPG) was determined for the following helminth species: *Ancylostoma caninum, T. canis, Toxocara leonina* and *D. caninum.* The age and sex of sampled dogs were recorded.

Statistical analysis

The data collected form each animal were coded and recorded in Microsoft excels spread sheet and then analyzed by using intercooled STATA version 8. A dog was classified as positive if at least one egg of zoonotic helminth parasite was present in its faecal sample. Overall prevalence was defined as the percentage of faecal samples positive for any parasites species, and the specific prevalence as the percentage of faecal samples positive for a given parasite species. Chi-square (χ^2) was used to measure association between prevalence of the helminths in different age and sex groups, t-test was also used to assess the association of different variables such as sex and age with mean egg per gram (EPG) count of the following helminth parasites; *A.caninum, T. canis, T. leonina* and *D. caninum*. The confidence interval (CI) for prevalence was calculated using binomial CI analysis in STATA software at 95%. All analyses were held at $P < 0.05$ for significant.

RESULTS

Out of the 334 dogs' faecal sample examined, the prevalence of intestinal helminth parasites eggs was 64.37% (215). During the study period the most frequently observed helminth parasite species in household dogs of Jimma was *A. caninum* (58.6%), followed by *T. canis* (25.7%), *D. caninum* (25.7%), *Taenia* spp eggs (18.3%), *T. leonina* (16.4%) and *Trichuris vulpis* (0.6%).

Among the infected dogs (215), 104 (48.4%) of them were harboring more than one helminth parasite, furthermore 59 (27.4%), 66 (30.7%), 64 (29.8%), 22 (10.2%), and 4 (1.8%) of the dogs were infected with 1, 2, 3, 4, 5, and 6 species of helminth parasite, respectively.

Statistically significant difference was observed in the overall prevalences between young and adult age groups ($P < 0.05$, $\chi^2 = 54.9$). In regard to gender there was no significant difference in the overall prevalence between male and female (Table 1)

The overall prevalence of helminth parasites in 11 different age groups showed a trend of general decrement as the age of the dog increases. The highest prevalence (100%) belongs to seven month old dogs and the lowest prevalence (20%) was recorded for six years old dogs (Figure 1).

The specific prevalences for each species of helminth parasites in different age and sex group are summarized in Table 2. The general prevalences of these parasites showed significant differences between young and adult dogs for each species of helminth, except for *T. vulpis* and *Taenia* spp, the prevalences of infection tend to be higher in young dogs (< 1 year). In contrast, no significant variation was documented in prevalence of each parasite species with regard to sex (Table 2).

The overall mean EPG counts (EPG ± Std. Err) for *A. caninum*, *T. canis, D. caninum* and *T. leonina* were 3374.2 ± 292.5, 657.5 ± 76.4, 622.1 ± 51.8 and 674.5 ± 96.2, respectively

Table 3 shows the mean EPG count recorded among *A. caninum*, *Toxocara canis, D. caninum* and *T. leonina* positive dog population in relation to age and sex. There was no significant difference in the mean EPG count among different age (young and adult) and sex groups for all of helminth parasite eggs recovered.

DISCUSSION

This cross sectional study demonstrated that gaste-rointestinal helminth parasites were common among

Table 1. Overall prevalence in dogs by age and sex.

Category	No animals examined	No of positive animals (%)	95% CI for prevalences	χ^2, P-value
Age				
Young	131	116 (88.5)	82.01-93.06	54.99, 0.000
Adult	203	99 (48.74)	38.47-53.15	
Sex				
Male	205	132 (64.39)	57.22-71.25	0.00, 0.99
Female	129	83(64.34)	55.43-72.57	

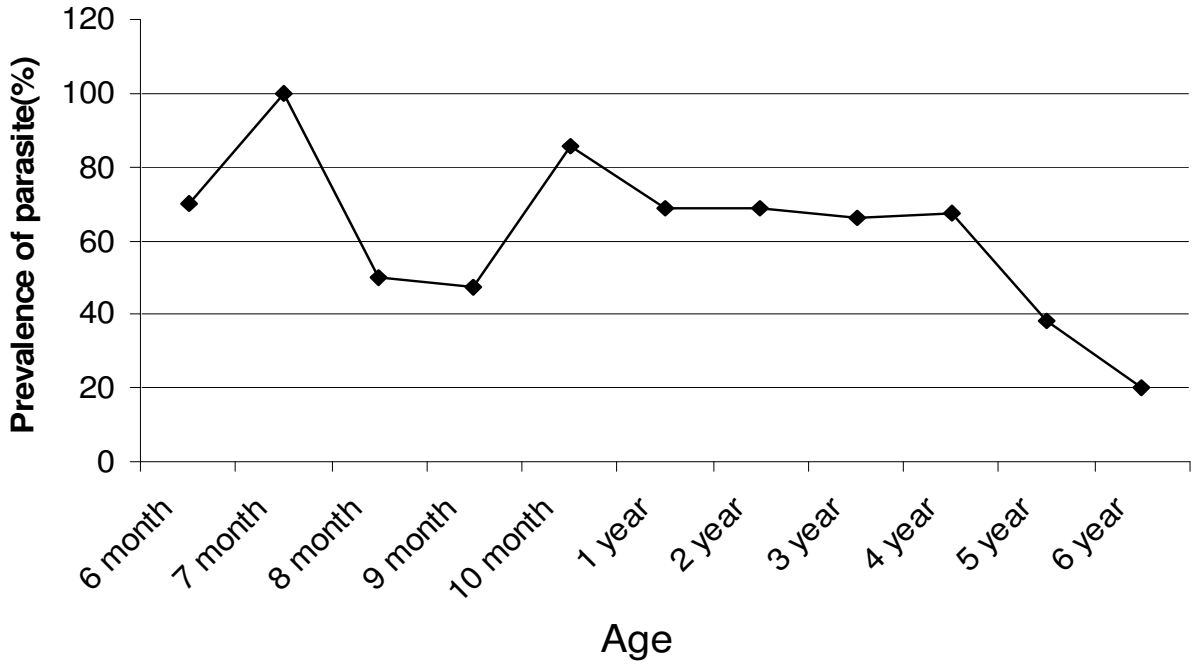

Figure 1. The overall age-specific helminth prevalence among examined dogs.

household dogs in Jimma town, Southwest Ethiopia. The present work also confirmed the occurrence of eggs of different species of nematode (*T. canis T. leonina, T. Vulpis* and *A. caninum)* and cestode (*D. caninum* and eggs of other *Taeniids* spp) in the faecal samples examined. All helminth parasites detected in the faecal samples are recognized as having a public health hazard. A similar observation was documented by previous studies in Ethiopia (Yacob et al., 2007; Endrias et al., 2010) and a few other literature from some tropical countries were in agreement with the present findings (Schandevyl et al., 1987 in Zaire; Fabiyi, 1983 in Nigeria).

The overall prevalence (64.4%) recorded in the present study is higher than previous, similar coprological studies of Yacob et al. (2007) and Endrias et al. (2010), whom reported prevalences of 51 and 52.9% in this country. The achieved prevalence is also higher than the 52.4%found by Maria et al. (2006) in Argentina, and 53% in Hungary (Fok et al., 2001). Our numbers agrees with the 68.4% recorded by Anene et al. (1996) in Nigeria. In contrast, a study done in some developed countries household dogs revealed a very low prevalences of gasterointestinal parasites when compared to our finding in Netherlands (Overgaauw, 1997), Belgium (Claerebout et al., 2009), UK and Iceland (Wolf and Wright, 2003; Roddie et al., 2008), and France (Regosz, 2007; Pullola et al., 2006). This difference can be associated with a high level awareness about dog parasites and socioeconomic status of pet owners in developed countries for hygiene and make use of the available veterinary cares for their animals (Schanntz, 1999). In addition to this some factors such as geographic location and diagnostic technique, demographic factor and anthelminthic usage are also responsible for the wide varity of endoparasite prevalence (Katagiri and Oliveria-sequeria, 2008).

Table 2. Prevalence of species of parasite in relation to age and sex (n= 131, 203, 205 and 129 for young, Adult, Male and female respectively).

Parasites	Age	Prevalence (no positive animals)	χ2 , p-values	Sex	Prevalence (no positive animals)	χ2 , p-values
T. canis	Young Adult	38.7(50) 17.9(36)	17.4,0.000	Male Female	24(50) 27.9(36)	0.51, 0.47
T. leonina	Young Adult	24.3(32) 11.3(23)	9.9, 0.002	Male Female	14.1(29) 20.2(26)	2.1, 0.15
A. caninum	Young Adult	85.4(111) 41.8(85)	61.9, 0.00	Male Female	60(123) 37.2(73)	0.28, 0.59
D. caninum	Young Adult	35.8(47) 19.2(39)	11.5,0.00	Male Female	27.3(56) 23.3(30)	0.68, 0.41
T. vulpis	Young Adult	1.5(2) - (0)	3.11, 0.07	Male Female	-(0) 2(0.9)	3.19, 0.07
Taenia spp	Young Adult	22.9(30) 15.3(31)	3.10,0.07	Male Female	29.7(61) 16.3(21)	0.55, 0.45

Table 3. Mean EPG count for some parasites in relation to age and sex of dogs.

Parasite	Age		t / p-values	Sex		t/ p-values
	Adult mean EPG ± Std. Err	Young mean EPG ± Std. Err		Male mean EPG ± Std. Err	Female MEAN EPG ± Std. Err	
T. canis	811.5±83.4	722±117.1	-0.7/ 0.76	3540.3±406.3	3089±376.8	0.02/ 0.77
T. leonina	621.7± 100.4	712.5± 149.5	-0.46/0.67	641.4± 87.7	711.5± 181.3	0.32/0.373
A. caninum	3422.3± 358.5.	3333.8± 457..3	0.15/ 0.44	3540.3.1±406.4	3089.1±376.4	0.85/ 0.19
D. caninum	566.6±46.2	668±86.6	-0.97/ 0.83	637.5±65.04	593±86.8	-0.40/0.65

The overall and specific parasite prevalences between male and female showed no statistical signify-cant variation. This finding was almost alike with the reports of Visco et al. (1977), Anene et al. (1996), Ramifrez-Barrios et al. (2004,) Maria et al. (2006) and Yacob et al. (2007).

The overall and specific parasites prevalence recorded in our study are strongly associated with age. The overall prevalence of helminth parasites was significantly higher ($P < 0.05$, $\chi^2 = 54.9$) in young dogs (< 1 year-old) than in adult. This is partially due to parasite specific immunity usually acquired with age or probably as consequence of single or repeated exposures (Ramirez-Barrios et al., 2004).

Out of the infected animals, 73.6% of them were found to be harbouring more than one helminth parasites. Similar observations have been documented in different places (Trabur et al., 2002; Endrias et al., 2010). On the other hand single helminth parasite infections were reported in studies conducted else where (Anene et al., 1996, Bugg et al., 1999, Papazahariadou et al., 2007). This difference may be attributed to the

level of awareness about dog parasite, regular deworming, housing and other management activities practiced in these areas.

The predominant species of zoonotic helminth parasite observed in this study was *A. caninum* (58.8%), which is in agreement with earlier reports here in Ethiopia (Yacob et al., 2007) and other countries such as Brazil (Oliveira-Sequeira et al., 2002; Katagiri and Oliveria-Sequeria, 2008), Argentina (Maria et al., 2006, South Africa (Minnaar et al., 2002) Tanzania (Swai et al., 2010) and in China (Wang et al., 2006). Moreover, the results of the study showed statistically significant variation ($P < 0.05$, $\chi^2 = 25.6$) in the prevalence of *A. caninum* in young and adult household dogs, being high in young dogs (85.4%). The overall prevalence of *T. canis* (25.8 %) based on faecal examination, recorded in the current study is higher than the previous reports of, Yacob et al. (2007) and Endrias et al. (2010) whom reported 21 and 17.1% for Deberzeit and Ambo areas, central Ethiopia. In addition the prevalence of *Toxocara* infection reported here was higher than the earlier reports from Netherland (Paul et al., 2009) and Belgium (Claerebout et al., 2009). The study revealed that the prevalence of *T. canis* was higher in young (23.3%) dogs than in adults (11.1%).

In this study we found eggs of *T. leonine* in 55 household dogs (16.5%), which were not reported in any of the previous study so far conducted in Ethiopia. A comparable prevalence of 14.2% was reported in Zaire and a very low prevalence (3.3%) was reported from Nigeria (Oluyomi, 2009).

The prevalence of *D. caninum* in faecal samples was 25.8%, which is comparable with the report of Endrias et al. 2010 (25.6%), but higher than the reports of Collins (1981), Anene et al. (1996), Minnaar et al. (2002), Papazaharidu et al. (2007). The published works in European countries demonstrated very low prevalence of *D. caninum*: Spain (Martinez Moreno et al., 2007), Finland and other Nordic countries (Pullola et al., 2006) as well as Australia (Bugg et al., 1999).

There was statistically significant difference ($P < 0.05$, $\chi^{2} = 11.4$) in the prevalence of *D. caninum* between the two age categories, with 51% in young and 35% in adult household dogs. The frequency of *T. vulpis* (0.6%) recorded in this study was lower than the recent findings of Yacob et al. (2007). This lower prevalence of *T. vulpis* may be due to unfavorable climate condition: even though its distribution is world wide, it is more common in temperate area (Bugg et al., 1999).

The prevalences of specific helminth parasite recorded in this study were statistically higher in young dogs ($P < 0.05$) than adult ones except in case of *Taenia* species and *T. lupis* (Table 2). There is a general consensus that the prevalence of intestinal parasites is higher in pups than adults, furthermore for *A. caninum* most young puppies, may get transmammary infection from the infected mother. Urquhart et al. (1996) and Visco et al. (1977) reported that infection with these parasites is higher in puppies, furthermore they can also get infected through contaminated feeds.

The faecal egg count (EPG) recorded for different species of parasite were elevated as compared to the previous reports of Yacob et al. (2007) and Oluyomi (2009). However there is no statistical variation on mean EPG count in infected animals in different age and sex groups.

Conclusion

This study revealed the presence of high prevalence and intensity of gasterointestinal helminth parasites in household dogs. In addition, all the species of helminth parasites recorded in the present work have potential zoonotic importance. Therefore attention must be given to public education that make people aware of the presence of zoonotic parasitic diseases from dogs and provide means of prevention to minimize the risk of acquiring the diseases.

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Full Length Research Paper

Nurses' knowledge, perceptions, and attitudes towards HIV/AIDS: Effects of a health education intervention on two nursing groups in Cairo University, Egypt

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Information education and communication (IEC) programs are the most effective available approaches for combating the HIV pandemic especially among nurses. The aim of this study is to assess knowledge, perceptions and attitudes towards HIV/AIDS before and after an IEC intervention program. The study used a prospective interventional design that was conducted on two different nursing groups: post-graduate nursing staff (67 nurses) and undergraduate nursing students (73 students). A significant improvement in the general knowledge and perceptions score was observed (from 7.29 ± 1.2 to 8.01 ± 1.5 with P <0.001). The intervention also succeeded to improve the mode of transmission knowledge score significantly from 6.83 ± 0.9 to 7.21 ± 0.8 (P <0.001). Furthermore, the intervention significantly improved the prevention knowledge score. The main source of information was television (66.7%). Although favorable attitudes increased after the intervention it did not reach the desired level. A planned HIV/AIDS education program significantly improved the HIV/AIDS knowledge, and to a lesser extent the perceptions and attitudes toward patients with HIV/AIDS. Further structured education should be conducted emphasising the role of mass media.

Key words: HIV/AIDS, knowledge, perceptions and attitudes, health education intervention.

INTRODUCTION

Since its emergence in 1981, the HIV pandemic has become one of the most serious infectious disease challenges to public health. Entering its' third decade, virtually every country is affected by it. Estimates of 2008 report showed that there are 33.4 million people living with HIV (PLWHA), 2.7 million new infections, and 2 million HIV – related deaths worldwide (UNAIDS, 2008).

Egypt is considered to have a low HIV prevalence, with estimates of less than 1% of the population as HIV-positive. However, unsafe behaviors among at-risk populations set Egypt at risk of a broader epidemic. In 2008, there were 510 deaths attributed to HIV/AIDS and 9,200 PLWHA, in Egypt (UNAIDS/WHO, 2008). By the end of 2009, the National AIDS Program (NAP) reported 3,919 HIV cases detected in Egypt, of which 2,920 were Egyptians. Among these, 1078 (27.5%) developed AIDS (National AIDS Program, 2008).

Since 1990 and till date, the number of detected cases has shown an exponential increase mounting to 268%. In the past decade alone, there was an increase by 120% (1,040 HIV and AIDS cases from 2001 to 2005 and 1,255 cases from 2006 to 2009). This perceived increase of HIV positive cases may be partially explained by the efforts of the NAP to improve HIV testing and reporting (National AIDS Program, 2008).

In most developing countries, the lack of universal adherence to infection control protocols, such as injection safety, poses a great risk for healthcare workers of occupational HIV infection at virtually every level of their daily work (Kermode, 2004; Nsubuga and Jaakkola, 2005; Ehlers, 2006). The duties of the nursing staff include collecting body samples (blood, urine, stool, sputum, etc.) from both out-patients and in-patients,

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Abbreviations: IEC, Information education and communication; **HIV,** human immune deficiency virus; **AIDS,** acquired immune deficiency syndrome; **PLWHA,** people living with HIV/AIDS.

administering oral, intravenous or intramuscular medication, in addition to cleaning patients and changing their bedding. Such activities are usually performed with no barrier protections putting both patients and health care workers at risk (Mbanya et al., 2001).

Several studies have explored HIV/AIDS knowledge, attitudes and practices (KAP) of healthcare workers in developing countries. Results revealed existence of anxiety and fear of contagion accompanied by lack of knowledge on HIV transmission and methods of prevention (Mbanya et al., 2001; Walusimbi and Okonsky, 2004; Oyeyemi et al., 2006). Nurses attitudes towards patients with HIV/AIDS have been shown to indicate negative and discriminatory behaviors (Mbanya et al., 2001; Oyeyemi et al., 2006; Reis et al., 2005), while fewer studies have pointed to more empathic attitudes (Walusimbi and Okonsky, 2004).

The lack of a vaccine or cure for HIV/AIDS makes information, education and communication (IEC) programs the only available approach for combating the pandemic (International Institute for Educational Planning/UNESCO, 2003). The positive impact of these programs on HIV/AIDS KAP has been previously reported (Uwakwe, 2000; Ezedinachi et al., 2002). It is imperative for nurses to be knowledgeable about HIV/AIDS transmission, prevention and treatment in order to maintain quality of care while coping with a universal increase in workload (Mazloomy and Baghianimoghadam, 2008).

No empirical data exists on the knowledge and attitudes of nurses towards HIV/AIDS at Kasr El Aini Teaching Hospital of Cairo University. Hence the aim of this study was to assess the basic knowledge of these nurses as regard HIV/AIDS and its available services in Egypt as well as their attitude towards HIV/AIDS and PLWHA, in order to identify training needs. Furthermore, the study sought to implement and evaluate the effectiveness of an education program regarding HIV/AIDS on their change in knowledge, and attitude.

METHODS

Study participants and setting

Two different nursing groups were included in this study. The first group consisted of post-graduate nursing staff (67 nurses) working in different departments of Kasr El Aini Teaching Hospital, of Cairo University and registered for post-graduate diploma, in their nursing specialties, at the nursing school of Cairo University. The second group was composed of the undergraduate nursing students (73 students in their first year) from the Technical Institute of Nursing (TIN) of Cairo University. This group joins TIN after finishing their secondary level of formal education for a period of three years.

Sampling technique

All the post-graduate nurses registered for a diploma were approached (n = 75) and asked to fill the anonymous study questionnaire in a voluntary manner. Only 67 questionnaires were returned at baseline, with a response rate of 89%. Among the undergraduate nurses (n = 80), only 73 returned their baseline questionnaire, with a response rate of 91%. All study participants, whether included in the study or not, were given the health education intervention during their classes.

Study design

The study used a prospective design, where participants' knowledge, attitudes and perceptions towards HIV/AIDS were assessed at baseline. Then a health education intervention was implemented followed by a post – intervention assessment.

The intervention

The health education intervention was in the form of a series of lectures combined with active group participation over a period of two weeks (four hours/week) for each group. Educational materials used were; brochures, videos, power point presentations and group discussion cases and questions. At the start of the sessions, students were asked if they approved to participate (in an anonymous manner) by completing a self-administered pre-test questionnaire to be followed by another post-test questionnaire to be completed at a later date. After two months following the intervention a post-test was undertaken by using the same interview questionnaire that was used in the pre-test. All respondents who originally participated at the beginning of the study participated in the post-test.

Assessment of the intervention

Participants' assessments were conducted using a pre-tested anonymous self-administrated questionnaire. The content validity of the questionnaire was established by literature review and expert reviewers. Reliability of the questionnaire was established through test-retest at a three week interval period which yielded a Pearson's correlation coefficient of 0.81. Each student was asked to select a code consisting of 5 characters (number, letters, symbols etc.), and to use the same code each time the questionnaire is completed.

The questionnaire contained the following sections: Age of participants, knowledge of HIV/AIDS which consisted of general knowledge (9 questions), modes of HIV infection (9 questions), and prevention of HIV infection (6 questions). Attitude towards an HIV infected patient was also assessed by 3 questions. The possible responses to all assessment questions were yes, no or don't know. After data collection items were scored as 1 (correct), and 0 (for other responses according to the questions). The overall score was calculated by adding the scores from all knowledge questions. Overall knowledge scores ranged from 0 to 24 (0 to 9 for general knowledge, 0 to 9 for mode of transmission, 0 to 6 for modes of prevention). The attitude score ranged from 0 to 3. Other questions included were those on sources of participants' knowledge as well as knowledge of available health services for HIV/AIDS in Egypt. These last questions were not scored.

Statistical analysis

All data were entered using the Statistical Package for the Social Sciences, Version 15 (software (SPSS Inc, Chicago, IL)). Responses to all the items were converted to a percentage indicating the proportion of correct responses versus other responses. The qualitative data were presented as frequencies and percentages. The calculated scores were presented as mean and standard deviation (SD) after checking for normality in distribution.

The McNemar test was used to compare paired qualitative data, while the paired t-test was used to compare paired quantitative data within each group. Comparison between groups (before and after intervention) was done using Chi square test for qualitative variables and student's t test for quantitative variables. A *P*-value of ≤ 0.05 was considered significant.

Ethical considerations

Ethical approval and administrative permissions for the study were obtained prior to data collection from the selected study settings. Participants were assured of the confidentiality of their responses (since data was collected in anonymous forms) and provided informed verbal consent. Data was preserved confidentially throughout the study in accordance with the Declaration of Helsinki.

RESULTS

Of the 140 participants enrolled in this study, 73 were undergraduates and 67 were post-graduate nurses. The mean age of the postgraduate nurses was 30.07 ± 6.75 years (range from 20 to 50 years) while that of undergraduates was 16.18 ± 0.98 years (range from 16 to 19 years).

The overall general knowledge about the diseases was considered to be good among the study participants. Following the intervention, more significant improvement in the general knowledge score was observed (P< 0.001) among all study participants (from 7.29 ± 1.2 to 8.01 ± 1.5). Significant improvement in the general knowledge score within each group was also detected. Additionally, a significant difference existed between both groups in the pre and post results with higher scores recorded among the undergraduates (7.79 ± 1.14 vs. 6.7 ± 1.6 and 8.24 ± 1.2 vs. 7.74 ± 1.3 among the undergraduates vs. postgraduates respectively) with P-values of 0.02 and < 0.001 respectively (Table 1). Among all respondents, 88.6% knew that HIV/AIDS is caused by a virus that attacks the immune system. Nearly 80% of the respond-dent knew that the abbreviation "AIDS" stands for Acquired Immune Deficiency Syndrome. By comparing both groups we found a significant difference between them at baseline (P = 0.01) and post intervention (P = 0.01) being highest among post-graduates (75.3 vs. 86.1% and 75.3 vs. 91%, respectively) as shown in Table 1.

Some misconceptions were identified among the participants. Slightly over two thirds of them (68.6%) thought that an HIV infected person looks tired and ill. This figure was reduced to 42.9% after the intervention. However the main difference was detected among the post-graduate nurses (P < 0.001), while no effect was detected among the undergraduate group. Additionally, 81.4% incorrectly believed that there is a cure for AIDS. This perception showed a significant improvement to reach 55.8% especially among the undergraduate nurse (from 80.8 to 53.4% after our intervention – P < 0.001). However, no difference was found among the post-graduate nurses (P = 0.22). On the other hand, only 7.1% of all participants knew that it is the most devastating disease of the century. Significant doubling of this percentage was detected after the intervention (15.7%) (P = 0.03). Another misconception was identified, as 92.1% of all participants thought that the disease is not present in Egypt. This notion was reduced significantly by the intervention to show an increase in the percent of correct responses, from 4.1 to 39.7% (P < 0.001) among undergraduates and from 11.9 to 29.9% among the post-graduates (P = 0.03) (Table 1).

Most respondents seemed to know the correct ways of HIV transmission, especially through infected blood (100%), as well as sharing of syringes and sharps with no difference between groups or within each group before and after the intervention (Table 2). However, surprisingly, more than 26 and 9% of the undergraduates and post-graduates respectively did not know about the sexual mode of transmission with a highly statistical significant difference between groups (P = 0.007). The intervention decreased these percentages to 9.6 and 6% respectively with no difference between groups after the intervention. The intervention significantly improved this understanding among the undergraduates as shown by increase in the correct response from 74 to 90.4% (P = 0.008) but showed no effect on post-graduates. Overall, 63.6% did not know that a woman with HIV can transmit it to her baby through lactation. This percentage decreased to 6% after the intervention. Furthermore, some respondents incorrectly thought that certain activities can transmit HIV, for example nearly half of responding subjects (52.9%) believed mosquitoes can transmit HIV and almost the same percent believed that sharing utensils with infected person can transmit the infection. The health education intervention succeeded to improve the knowledge as regards transmission though lactation especially among undergraduates (significant improvement from 47.9 to 94.5% and from 23.9 to 94% in the undergraduates and post-graduates respectively – P< 0.001). Furthermore, a significant improvement as regards transmission by mosquito bite was detected among all participants (from 52.9% in pre-test to 27.2% in the post-test – P = < 0.001) especially among post-graduate nurses only (increase in correct response from 47.8 to 89.6% P< 0.001). On the other hand, 42.5 of undergraduate still believed in HIV transmission by mosquito bite. The health education intervention significantly improved the findings of the item on sharing utensils in both groups. Mode of transmission overall knowledge score showed a statistically significant increase in both groups (from 6.99 ± 0.9 to 7.4 ± 0.9 in the under graduates and from 6.99 ± 0.7 to 7.0 ± 0.6 in the post graduates). A significant difference was detected while comparing both groups in the pre and post intervention (P = 0.02 and 0.004 respectively). Higher scores were observed among the undergraduate nurses (Table 2).

Table 1. Comparison of correct responses, among study participants, regarding general knowledge about HIV/AIDS.

General knowledge questions	Undergraduate nurses (N = 73)		Post-graduate nurses (N = 67)		P_1 value	P_2 value
	Pre-test N (%)	Post-test N (%)	Pre-test N (%)	Post-test N (%)		
1-AIDS is not curable but treatment exists to improve quality of life.	14 (19.2)	34 (46.6)	12 (17.9)	19 (28.4)	0.51	0.02
P value	< 0.001		0.22			
2-AIDS stands for anti infectious disease situation.	57 (78.1)	67 (91.8)	55 (82.1)	56 (83.6)	0.21	0.07
P value	0.04		0.97			
3-AIDS stands for acquired immune deficiency syndrome.	55 (75.3)	55 (75.3)	59 (86.1)	61 (91)	0.01	0.01
P value	1.00		0.79			
4-AIDS is caused by a virus that attacks the immune system.	63 (86.3)	63 (86.3)	61 (91)	63 (94)	0.32	0.11
P value	1.00		0.73			
5-An HIV infected person always looks tired and ill	39 (53.4)	41 (56.2)	5 (7.5)	39 (58.2)	0.34	< 0.001
P value	0.87		< 0.001			
6-AIDS affects people who leave an immoral life.	55 (75.3)	62 (84.9)	58 (68.6)	65 (97)	0.49	< 0.001
P value	0.25		0.065			
7-AIDS is not present in Egypt.	3 (4.1)	29 (39.7)	8 (11.9)	20 (29.9)	0.07	0.14
P value	< 0.001		0.03			
8-AIDS is the most devastating disease in the century.	6 (8.2)	15 (20.5)	4 (6)	7 (10.4)	0.42	007
P value	0.08		0.54			
9-AIDS only affects gay people.	5 (6.8)	12 (16.4)	2 (3)	22 (32.8)	0.25	0.01
P value	0.118		< 0.001			
General knowledge score (mean ± SD)	7.79 ± 1.1	8.24 ± 1.2	6.76 ± 1.6	7.74 ± 1.3	0.02	< 0.001
P value	0.017		0.001			

P_1 between groups in pre-test, P_2 between groups in post-test.

Although, most respondents can correctly select the HIV prevention methods, some often select incorrect ones as well. Nearly all respondents knew that not sharing syringes is a method of prevention and most knew that having sex with only one uninfected and faithful partner and correctly using a condom were correct modes of prevention. Nevertheless, this still leaves 22.1% ignorant to the fact that having one uninfected and faithful partner can prevent HIV and 33.5% of participants were unaware that always using a condom correctly when having sex can prevent HIV. The health education intervention improved the correct responses of those items to 85.7 and 87.1% respectively. Very interestingly, almost more than one third of all the respondents thought that showering, not eating food sold on the street and not smoking can prevent HIV infection. Those misconceptions were corrected significantly by the intervention in both groups although no statistical significance was detected within each group except for the item on sold food on the street, where the intervention was positive among the undergraduate group (P = 0.006). The intervention significantly improved the prevention knowledge score among entire participants from 5.06 ± 1.1 to 5.39 ± 0.8 (P< 0.001). Additionally, the mean score of prevention knowledge significantly increased within each group separately (from 5.14 ± 0.6 to 5.42 ± 0.9 in under graduates, and from 4.97 ± 1.4 to 5.43 ± 0.6 in post-graduates), but not between groups (Table 3).

Any information a participant may have received

Table 2. Comparison of correct responses, among study participants, concerning HIV/AIDS mode of transmission.

Mode of transmission questions	Undergraduate nurses (N = 73)		Post-graduate nurses (N = 67)		P_1 value	P_2 value
	Pre-test N (%)	Post-test N (%)	Pre-test N (%)	Post-test N (%)		
1-Receiving an HIV infected blood	73 (100)	73 (100)	67 (100)	67 (100)	-	-
P value	-		-			
2-Bitten by a mosquito	34 (46.6)	42 (57.5)	32 (47.8)	60 (89.6)	0.51	< 0.001
P value	0.28		< 0.001			
3-Having sex with any one without using a condom	54 (74.0)	66 (90.4)	61 (91)	63 (94)	0.007	0.32
P value	0.008		0.72			
4- Touching person living with HIV	63 (86.3)	67 (91.8)	60 (89.6)	63 (94)	0.44	0.15
P value	0.58		0.54			
5-Sharing utensils with person living with HIV	16 (21.9)	45 (91.6)	45 (67.2)	61 (91.2)	< 0.001	< 0.001
P value	< 0.001		0.002			
6-Reusing someone else's syringe	67 (91.8)	71 (97.3)	64 (95.5)	62 (92.5)	0.29	0.19
P value	0.28		0.72			
7-By smoking or snorting drugs	53 (72.6)	57 (78.1)	56 (83.6)	56 (83.6)	0.08	0.27
P value	0.57		0.92			
8-From mother to her baby	70 (95.9)	72 (98.6)	60 (89.6)	67(100)	0.13	0.52
P value	0.62		0.02			
9- From mother to her baby through lactation	35 (47.9)	69 (94.5)	16(23.9)	63 (94)	0.03	0.59
P value	< 0.001		< 0.001			
Mode of transmission score (mean ± SD)	6.99±0.9	7.4 ± 0.9	6.66 ± 0.7	7.0 ± 0.6	0.02	0.004
P value	0.007		0.004			

P_1 between groups in pre-test, P_2 between groups in post-test.

on HIV/AIDS was found to be from television (66.7%) and reading material such as magazines and newspaper (50.7%). The latter showing a significant difference between groups being highest among the undergraduates (P< 0.001). The health institutes (Nursing school and TNI) also play a significant role as a source of information, especially among the undergraduates with affirmative responses of 52.1% among undergraduates vs 35.8% among post-graduates (P = 0.03). Religious and web sources were the least likely sources of information on HIV/AIDS among the two groups (13.2 and 9%, respectively) with no difference between the two groups (Figure 1). It is to be mentioned that only 6.9% of all respondents knew where to go for HIV/AIDS services. This percent increased significantly to reach 40% after the intervention.

However, when it comes to understanding about PLWHA and consequently, attitudes towards them, the responses are somewhat worrisome. Overall, most participants (75.7%) would not feel comfortable sharing an office with a person living with HIV/AIDS. This finding significantly improved after the intervention within each group (but not between groups) with a rise of 19.2 and 16.4% in the undergraduate and post-graduate groups respectively. Similarly, 76.5% of all participants did not think that people living with HIV/AIDS should continue working in their organization or go school. This finding improved significantly after the intervention by 16.4% in the undergraduate group and by 14.9% in the post-graduate group.

Table 3. Comparison of correct responses, among study participants, regarding HIV/AIDS modes of prevention.

Methods of prevention questions	Undergraduate nurses (N = 73)		Post-graduate nurses (N = 67)		P_1 value	P_2 value
	Pre-test N (%)	Post-test N (%)	Pre-test N (%)	Post-test N (%)		
1-Using new syringe	71 (97.3)	71 (97.3)	62 (92.5)	67 (100)	0.27	0.19
P value	-		0.66			
2-Having sex only with your faithful partner	53 (72.6)	62 (84.9)	56 (83.6)	58 (86.6)	0.08	0.49
P value	0.64		0.815			
3-Not smoking cigarettes	49 (67.1)	57 (78.1)	50 (74.6)	52 (77.6)	0.28	0.85
P value	0.20		0.85			
4-Not eating food sold on the street	43 (58.9)	59 (80.8)	48 (71.6)	52 (77.6)	0.08	0.35
P value	0.006		0.57			
5-Always using condom when you having sex	45 (61.6)	62 (84.9)	48 (71.6)	60 (89.6)	0.14	0.28
P value	0.003		0.012			
6-Taking a shower once a day	51 (69.9)	58 (79.5)	39 (58.2)	49 (73.1)	0.10	0.24
P value	0.23		0.11			
Methods of prevention score (mean ± SD)	5.14 ± 0.6	5.42 ± 0.9	4.97 ± 1.4	5.43 ± 0.6	0.95	0.37
P value	0.019		0.023			

P_1 between groups in pre-test. P_2 between groups in post-test.

Most participants felt obliged to report PLWHA with 56.2% of undergraduates and 67.2% of post-graduates feeling obliged to do so. This finding also improved significantly after the intervention within groups (Table 4). Almost all respondents (97%) do not know anyone living with HIV/AIDS.

The total knowledge score showed a significant improvement within the groups after the intervention among undergraduates as well as a significant difference between groups. Higher scores were detected among the undergraduates than post-graduates (20.4 ± 1.7 vs 19.2 ± 1.9 respectively in the pre-test and 20.6 ± 2.1 vs.19.4 ± 1.6 respectively in the post-test). Although, favorable attitudes increased after the intervention but it did not reach the desired level. A slight significant improvement in the attitude score among post-graduates was detected (from 2.09 ± 0.3 to 2.37 ± 0.5). However, no significant difference was detected between the groups (Table 5).

DISCUSSION

The present study aimed to assess knowledge, and attitudes towards HIV/AIDS among undergraduate nursing students and post-graduate nursing staff at Kasr El Aini teaching hospitals of Cairo University. The study was also seen as an opportunity to provide lacking information and correct misconceptions about different aspects of HIV/AIDS among these groups. Our study confirmed the success of the intervention in improving the knowledge and favorable attitudes among the respondents with varied levels of significance. In general, the undergraduate group seemed to have benefited better than the post-graduate nurses as they exhibited better acquisition of knowledge after the intervention. Better knowledge detected among the undergraduates is related to more readiness in accepting information and recalling it than the post-graduates who were older and more preoccupied in their work.

The studied groups exhibited good general knowledge about HIV. The findings indicate that the majority of the respondents were aware of the nature of HIV/AIDS. Similar finding were reported by Wong et al. (2008) in their cross sectional study in Malaysia among adults aged from 15 to

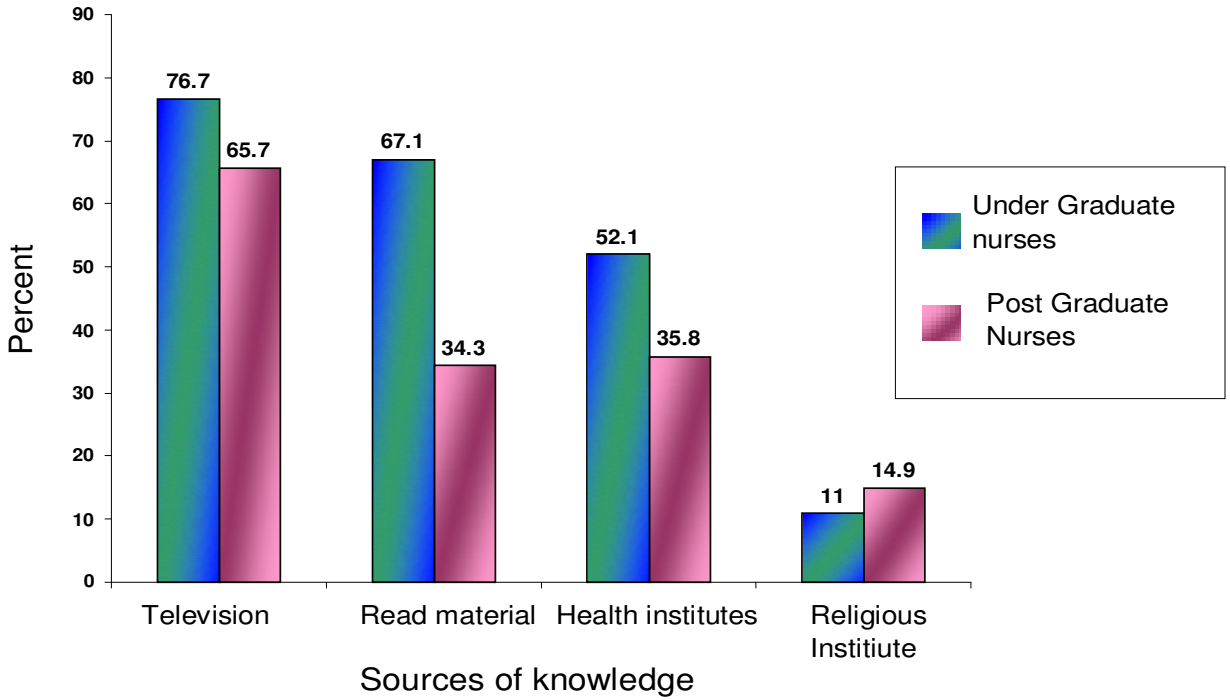

Figure 1. Sources of knowledge among the studied groups.

Table 4. Comparison of attitudes towards HIV/AIDS among study participants.

Attitude questions	Undergraduate nurses (N = 73)		Post-graduate nurses (N = 67)		P_1 value	P_2 value
	Pre-test N (%)	Post-test N (%)	Pre-test N (%)	Post-test N (%)		
1- HIV infected patients are allowed to school or work	17 (23.3)	29 (39.7)	16 (23.9)	26 (38.8)	0.56	0.27
P value	0.05		0.02			
2- Felling comfortable sharing office with a colleague infected person	16 (21.9)	30 (41.1)	18 (26.9)	29 (43.3)	0.38	0.37
P value	0.03		0.008			
3- Felling legally and or morally obliged to report a colleague infected person	41 (56.2)	7 (9.6)	45 (67.2)	6 (8.9)	0.07	0.33
P value	< 0.001		0.004			

P_1 between groups in pre-test, P_2 between groups in post-test.

Table 5. Comparison of overall knowledge and attitude scores among the study participants.

Total scores	Undergraduate nurses (N = 73)		Postgraduate nurses (N = 67)		P_1 value	P_2 value
	Pre-test Mean ± SD	Post-test Mean ± SD	Pre-test Mean ± SD	Post-test Mean ± SD		
Overall knowledge score	20.4 ± 1.7	20.6 ± 2.1	19.2 ± 1.9	19.4 ± 1.9	0.02	< 0.001
P value	0.08		0.71			
Attitude score	2.09 ± 0.4	2.27 ± 0.4	2.09±0.3	2.37 ± 0.5	0.99	0.22
P value	0.12		< 0.001			

P_1 between groups in pre-test, P_2 between groups in post-test.

49 years. The mean (± SD) and median of the total correct general HIV/AIDS knowledge scores of all respondents on a 7 item test were 4.6 ± 1.4 and 5.0, respectively. In agreement with this, are findings of Ayranci (2005) in his population-based study on AIDS knowledge, attitudes and misconceptions among the general population in Eskisehir, Turkey that involved 1048 participant aged 11 to 83 years. This study demonstrated a proper level of general knowledge among their respondents as indicated by a total mean score of general knowledge of 4.6 and 5 out of 7 points respectively.

However, in our study, a need for improvement was detected at baseline, as a considerable percentage (81.4%) incorrectly believed that there is a cure for AIDS and that persons living with HIV can be recognized by appearance (68.6%). The main problem with those who are unaware that an HIV-infected person may be asymptomatic is that they are more at risk because they are unaware that they could be infected by an apparently healthy individual (Sarker, 2005). These findings are much higher than those reported by others as Wong et al. (2008) who reported 18.1%, Ayranci (2005) who reported 30% and Hayyawi et al. (2010) who conducted their study in Baghdad, Iraq and included 335 adult respondents of both sexes and mean age 28 ± 8 years. They reported that 54.9% of their respondents thought that there is a cure for AIDS. Additionally, Wong et al. (2008) and Ayranci (2005) reported that 28.7 and 39.2% of their participants thought that HIV infected persons could be recognized by appearance. Our intervention improved these misconceptions which were reduced to 55.8 and 42.9%, respectively but despite this they are still higher than those of previous studies and still need further educational interventions especially for the post-graduates who lack any in-service training and refresher courses.

Proper knowledge regarding possible routes of transmission is not only crucial for decreasing the infection rate, but it is also important to dispel persistent myths as partial knowledge can further prolong the risk of infection (Babakian et al., 2004). A majority of respondents in our study gave correct responses about the methods of transmission and ways of prevention of HIV, especially regarding, infected blood, sharing of syringes and sharp instruments which agree with findings of other studies (Wong et al., 2008; Hayyawi et al., 2010; Al-Mazrou et al., 2005). However, surprisingly, more than 26 and 9% of the undergraduates and post-graduates respectively did not know about the sexual mode of transmission. This may be due to cultural reserve in discussing sex which is demonstrated by higher percentages among the undergraduate nurses, who are still unmarried. The intervention decreased these percentages to 9.6 and 6% respectively being highly significant among the undergraduates. Matched with our results, are those reported by Bhosale et al. (2010) which was conducted among the adolescent school and junior college nurses students in India and involved 1024 participants with the majority aged 14 to 17 years. They demonstrated that 30% of the nurses under study, did not know about this method and this was reduced to 16% after the intervention.

The study revealed that there were some important misconceptions among the respondents regarding the mode of transmission. Nearly half of them, from both groups, believed that HIV can be transmitted by a mosquito. Other studies have also found a prevalence of this misconception among nurses (Bhosale et al., 2010), young adults (Tung et al., 2008), adults (Tan et al., 2007) and in the older populations (Hillman, 2008). In our study, this misconception was removed to some extent by the intervention package to reach 27.2% which exceeds results of Bhosale et al. (2010) who showed that 37% of the respondents

still harbour this myth after the intervention. Another misconception that can adversely affect attitudes towards PLWHA was that some respondents believed that HIV can be transmitted by sharing utensils. Similar finding was obtained by Hayyawi et al. (2010) which exhibited a percentage of 56.7% among adults in Iraq. This misconception was significantly reduced in the present study to be 24.3% by effects of the health education intervention. In India, Bhosale et al. (2010) reported that more than 10% of junior nurses had this misconception at baseline but this was reduced to less than 7% by their intervention.

It was also of concern that 63.6% of the post-graduate nurses were unaware that HIV could be transmitted through breastfeeding. Our results are comparable to Sharma's study (2008). This study was conducted in Nepal and recruited 67 adults of both sex aged 20 to 50 years. This study reported a figure of 85.1%. Similar finding was obtained by Hayyawi et al. (2010) which report 62.5%. This percentage was improved after our intervention to be 6% which is in concordance with the percentage reported by Sharma (7.5%) after their intervention. The health education intervention succeeded to improve significantly the mode of transmission knowledge score which is matched also with findings of Sharma (2008).

As regards prevention, most of our respondents knew the possible methods of prevention. However some misconceptions were discovered and they were improved by our intervention. The mean score of prevention knowledge was improved significantly after the intervention and this is in concordance with findings reported by Wong et al. (2008).

In contrast to other studies which demonstrated that high education level was associated with higher knowledge scores about HIV (Ayranci, 2005; Hayyawi et al., 2010; Eshetu et al., 2004), our study revealed that better overall knowledge scores were recorded among the undergraduates than among post-graduates. The underlying reason for this may be attributed to the fact that younger generations are probably introduced to the subject in their academic curriculum. Additionally, their readiness to accept and retain the information is much greater than the working nurses who are overloaded by their work and social duties that do not give them enough time to update their knowledge periodically. An inverse relation between age and knowledge has been reported by others (Mbanya et al., 2001; Umeh, 2008). Educational efforts need to be targeted at those who are most misinformed to meet the needs of different populations.

Mass media, especially the visual, is an accessible, widespread and effective means of knowledge dissemination. The messages provided from this media about sexually transmitted diseases should match our social norms and religious values. Taking everything into account, the media should implement new methods for AIDS education in other to improve public knowledge of HIV/AIDS. Local television and satellite channels represented the main source of information about HIV/AIDS in this study, while reading material in the form of magazines and newspaper, ranked second. Our results agree with the findings of studies conducted in Iraq (Wong et al., 2008), Turkey (Ayranci, 2005), Cameroon (Hayyawi et al., 2010), and Malaysia (Mbanya et al., 2001), but disagree with a study conducted in Saudi Arabia in which friends were the main source of information for males and booklets for females (Al-Mazrou et al., 2005). Internet was the least reported source of information (17%) due to inaccessibility in many areas as well as its high cost of provision in addition to lack of proper training on use of the different web sites. A similar study conducted in the Eastern Mediterranean region involved a total 53 respondents from 17 countries out of the 23 Eastern Mediterranean countries. Among the participants there were 15 national AIDS programme managers or their assistants, 7 NGO representatives, 26 participants from international agencies and 5 from related sectors. This study demonstrated that 15.1% of the respondents reported that internet is not an appropriate source of information to them (Tawilah et al., 2002).

Negative attitudes towards HIV-positive individuals at school and at work were observed in our study, although the post-graduates group were more accepting towards contact with HIV-positive individuals than undergrad-duates. However, even after the intervention more than half of our study sample overall would avoid HIV-positive individuals at work or in public. This result is in agreement with what others found in Iraq (Ayranci, 2005), Turkey (Hayyawi et al. 2010), Iran (Tavoosi et al., 2004) and India (Agrawal et al., 1999). A slight improvement in the attitude was observed after the intervention which is comparable with Tan et al. (2007) who conducted a study among 259 Chinese undergraduates. Reporting of PLWHA was also found to be high. According to the Egyptian law, all infectious diseases should be reported by health institutions to the national health authorities. However, individual reporting is discouraged. By the end of our intervention, the significant improvement in attitudes of both groups was detected to this question.

A very small percentage of our respondents knew where to go for HIV services as regard testing, counseling and treatment. The result is in contrast to that obtained by Wong et al. (2008) where nearly 90% of Malaysian adults know about this service. This reflects the defective role of mass media in dissemination of this information in spite of the presence of AIDS hotlines in Egypt where calls averaged around 1000 per month as reported by UNAIDS, (2000).

LIMITATIONS OF THE STUDY

Taken as a whole, findings of this study indicate that the health education intervention was effective in enhancing

knowledge, perceptions and attitudes of participants towards HIV/AIDS. However, the question whether the effects of this intervention were maintained over time was not addressed in this study. An additional limitation includes the fact that many items in the questionnaire used, assessed participants recall of information. It was not possible to assess the degree to which this information was applied in participants' actual work.

Furthermore, the small sample size makes it impossible to generalize the study results outside of our institution.

Conclusions

The overall general knowledge about the diseases was considered to be good among the study participants, although most people showed negative attitudes at the beginning of our study. A planned HIV/AIDS education program significantly improved the HIV/AIDS knowledge, and to a lesser extent the attitudes toward patients with HIV/AIDS. Some misconceptions about HIV/AIDS were corrected through the health education intervention, as detected by the improved correct response rates. However, a small proportion still exists and needs to be addressed by other health education programs. Television was found to be the most important source of knowledge among our study participants.

Recommendations

Structured education in the form of school curricula, health talks/ seminars, in-service training, and continuous education should be targeted at the nursing staff.

The role of television channels should be emphasized in distributing accurate, active and effective messages to the population, especially the younger age groups, about sexually transmitted diseases. These messages should match our social norms and religious values.

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Full Length Research Paper

Visceral fat with its risk factors amongst the Indonesian Javanese elderly

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Direct and indirect risk factors are implied in increased elders' visceral fat level, namely socio-economic, gender, age, workload, physical activities and eating pattern. The aim of study was to get the information on visceral fat level and its risk factors amongst The Indonesian Javanese elderly. A total of 812 elder's (517 women and 295 men) participated in the cross sectional study. Results showed that 12.8% of respondents with high level of visceral fat and 26.7% almost reach high level. Rural and urban areas, educational background, workload when aged 25 and 55 years, and physical activities aged 25 and 55 years had significant correlation with the visceral fat. Body Mass Index (BMI), weight, and height had a significant association with the visceral fat whereas the highest on the BMI (r = 0.896). A decreased visceral fat pattern following reduced weight and height according to sex. Mild physical workload aged 55 years had the opportunity of 2.29 times greater than those who had the heavy workload level at the same age. Nutrition education for elderly should include advice to increase physical activity in order to reduce high level of visceral fat.

Key words: Visceral fat, risk factors, elderly, physical activity, workload.

INTRODUCTION

Indonesia is facing an increased population of elderly from 4.48% in 1971 to 9.77% in 2010 (Sunusi, 2006). Currently, the country is the 5th country with the highest elderly population after China, India, U.S., and Mexico with its 1,000 ethnic and sub-ethnic groups (WHO, 2002). Aging issue in Indonesia is varied according to the area and ethnic groups. The aging proportion in several cities and districts are higher compared to the proportion for the whole country. For example, 8.5% on Yogyakarta City, 10.65% on Gunung Kidul District, 10.01% on Wonogiri District; and 10.13% on Magetan District. Javanese ethnic is the biggest populaton (48.6%) compared to the four biggest populated ethnics in Indonesia, namely Bataknese, Sundanese, Malay and Madurese (Ananta et al., 2005). The increased number of elderly affects their life aspects through physical, biological, psychological, and social changes or the occurrence of degenerative diseases due to aging process. One of the risk factors for degenerative diseases in elderly is obesity.

Obesity is the initial trigger of increased occurrence of coronary heart disease (CHD). Metabolic syndrome has been correlated with visceral fat compared to the gynoid/lower body obesity. The aging process is normally marked by increased fatty mass and progressive concentrated adipose tissue distribution (visceral fat). These changes have important impacts on the risk for various diseases/disorders related to metabolism including insulin resistance, diabetes, and cardiovascular disease, which can be seen in the results from several epidemiological studies. Females are especially susceptible to increased visceral fat level when they achieve menopause period. Factors that play a role in increasing visceral fat level in elderly are socio-economics, gender, age, workload, physical activities, and eating pattern (Chatchalit and Rattana, 2004; Goya et al., 2005; Helena et al., 2001; Maria, 2010; Abdallah et al., 2010). National data on visceral fat level proportion on elderly poeple is virtually absent. Keeping this view in mind, the present study was carried out to get the information on visceral fat level and its risk factors

amongst the Indonesian elderly people.

MATERIALS AND METHODS

Study design and participation

This cross-sectional study comprised 812 elderly (517 females and 295 males). Subjects belonged to the Javanese population andwere inhabits of Surabaya, Semarang and Yogyakarta, representing urban areas; and Wonogiri, Gunung Kidul and Magetan, representing rural areas. The study was implemented between December 2007 and February 2008. The participants were selected randomly from 54 villages/hamlet and 18 sub-districts. This study had been approved by the Ethical Committee of Indonesian MOH Research and Development Body. The inclusion criteria of repondents were male and female aged at least 55 years, living in the communities, came from Javanese ethnic, and had a healthy condition.

Data collection

Primary data were collected through two ways

(1) Structured interview on food consumption history using FFQ (Food Frequency Questionnaire) semi-quantitative tool.
(2) Physical activities in a structured questionnaire.

The respondent food consumption history and physical activities were assessed for the situation when the respondent aged 25 and 55 years old. The objective of collecting recall data in these two periods was aimed to analyze the correlation of energy and fat nutrient intakes, which had bigger calories than protein, and physical activities during young and old period with the visceral fat status during the elderly period.

Visceral fat in standing position was measured using Omron Body Fat Analyzer HBF 352. This tool is an excellent tool to quickly measure human body fat percentage and body mass. The subject were asked to stand up with both feet slightly apart and place both hands on the monitor by holding the grip electrodes. The subject should hold his/her arms straight out at an angle of 90° to his/her body and do not move during the measurement. Classification of visceral fat was defined from three levels:

(i) Normal (1-9).
(ii) Approaching high (10-14).
(iii) High (>15) (Omron, 2006).

Based on the most commonly reported foods and portion sizes, we constructed a food list with the units of measurement. The food list was converted to a Semi-Quantitative Food Frequency Questionnaire (SFFQ) format following the basic pattern of SFFQ using usual reported portions. The long SFFQ was field-tested, shortened, and developed into the final SFFQ (Table 1). To develop the SFFQ we went through the following steps:

(I) Construction of a food list.
(ii) Definition of portion sizes, and assignment of frequency of consumption.
(iii) Pilot test of long-FFQ and assembling the selected food list into SFFQ.

Adequacy of nutritional intake defined from 80% of The Indonesian Recommended Dietary Intake (RDA) which is suitable for general population nutritional status assessment. Before SFFQ practiced in the field, it has been pretested in the small sample with the quite high validity.

The physical activities (PA) questionnaire assessed daily routine activity at home and or outdoor, leisure time and sport when respondents aged 25 and 55 years. Three items of assesment covered type, duration per week, dan frequency per week. Type of sports were divided into three levels: light, moderate, and heavy (Durnin and Passmore 1955).

Statistical analyses

Means and standard deviations for the independent variables: area where the elderly lives, gender, age, work load in 25 and 55 years old, fat and energy intakes in 25 and 55 years old as well as the economic status with dependent variable, that is, visceral fat level were analyzed using paired t-test. The correlation coefficient between the visceral fat with height, weight and BMI was used to analyze the determinant factors related to visceral fat. All statistical analyses were performed using the SPSS version 13. A p value of 0.05 was considerd as significant difference.

RESULTS

The mean of visceral fat of high and approaching high levels in the urban area were similar with rural area. Female elderly had a slightly higher level of visceral fat compared to male. Younger elderly group (55 to 65 years old) had an average visceral fat level that was almost similar to the 66 to 85 years old group (Table 2). A positive correlation ($p < 0.05$) was observed between high educational level with mean of visceral fat level.

Visceral fat level had significant association with educational background. High level of visceral fat in low educational group was bigger than in high education. This means high education people had lower high level of visceral fat compared to low education people. The physical workload in 25 and 55 years old points of time has a relation with the average visceral fat level.

Elderly with mild physical workload were different from the elderly with high workload. Low activity level lead to a slightly higher level of visceral fat compared to the moderate and high activity levels (Table 2). Significant difference was observed for the mean of energy and fat intakes level with visceral fat level. Adequate energy intake group when aged 25 years old had a slightly higher level visceral fat compared to less energy intake group (Table 3). BMI had the highest correlation with visceral fat (Table 4). It was observed that visceral fat decrease with reducing height and weight. Increasing height and weight will increase high level of visceral fat. However, there was no correlation between height as well as weight with visceral fat according to gender (Table 5). Mild physical workload had 2.29 higher chance to have high level visceral fat compared to the elderly with high level after being controlled by other risk factors (Table 6).

DISCUSSION

Significant positive association was observed between

Table 1. Semi quantitative food frequency questionnaire (SFFQ).

Type of food	Frequency of consumption								House-holdportion (g)
	> 1/day	1 ×/day	3-5×/ week	1-2 ×/ week	2-3 ×/ month	1 ×/month	1-2×/year	Never	
Carbohydrate									
a. Rice	7	6	5	4	3	2	1	0	
b. Biscuits	7	6	5	4	3	2	1	0	
c. Etc	7	6	5	4	3	2	1	0	
Fat	7	6	5	4	3	2	1	0	
a. Meat	7	6	5	4	3	2	1	0	
b. Egg	7	6	5	4	3	2	1	0	
c. Chicken	7	6	5	4	3	2	1	0	
d. Etc	7	6	5	4	3	2	1	0	

Table 2. Mean of visceral fat based on areas, gender, age, education level, type of work, and physical activity level (aged 25 and 55 years old).

Variable	Level of visceral fat							
	High		Approaching high		Normal		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Area								
Urban	18.0	± 3.3	11.5	± 1.4	6.3	± 2.2*	10.0	± 4.9*
Rural	18.0	± 3.2	11.5	± 1.3	5.2	± 2.3	7.4	± 4.5
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9
Gender								
Male	17.6	± 2.8	11.6	± 1.3	5.7	± 2.3	9.2	± 4.8
Female	18.3	± 3.5	11.4	± 1.4	5.7	± 2.3	8.6	± 4.9
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9
Age group								
55-65 y.o	18.1	± 3.4	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9
65-85 y.o.	17.8	± 3.0	11.5	± 1.3	5.9	± 2.4	9.0	± 4.9
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9
Education level								
Low	18.4	± 3.7	11.5	± 1.4	5.4	± 2.3*	8.0	± 5.0*
High	17.6	± 2.6	11.5	± 1.3	6.4	± 2.1	10.0	± 4.4
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9

Table 2. Contd.

Workload (aged 25 y.o)								
Low	18.0	± 3.1	11.5	± 1.3	6.2	± 2.3*	9.7	± 4.8*
High	18.1	± 3.7	11.4	± 1.5	5.1	± 2.2	7.5	± 4.7
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9
Workload (aged 55 y.o.)								
Mild	18.0	± 3.1	11.5	± 1.3	6.2	± 2.2*	9.6	± 4.8*
Severe	18.1	± 3.7	11.6	± 1.5	5.0	± 2.2	7.0	± 4.6
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9
Physical activity level aged 25 y.o.								
Mild	17.2	± 2.1	11.6	± 1.3	6.0	± 2.3*	9.3	± 4.7*
Moderate	18.7	± 3.5	11.4	± 1.4	5.9	± 2.3	9.2	± 5.0
Severe	18.5	± 4.2	11.6	± 1.3	5.3	± 2.3	8.0	± 4.8
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9
Physical activity level aged 55 y.o.								
Mild	17.3	± 2.6	11.6	± 1.4	6.1	± 2.3*	9.4	± 4.6*
Moderate	18.4	± 3.5	11.5	± 1.4	5.8	± 2.3	9.2	± 5.2
Severe	18.4	± 3.5	11.4	± 1.3	5.4	± 2.2	7.9	± 4.6
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9

* Significance level at $p < 0.05$. SD: Standard deviation.

Table 3. Mean of visceral fat level according to energy and fat intakes (aged 25 and 55 years old).

Variable	Level of visceral fat							
	High		Approaching high		Normal		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Energy intake adequacy (aged 25 y.o)								
Poor (< 80% RDA)	17.8	± 2.8	11.5	± 1.3	5.8	± 2.3	8.8	± 4.8
Adequate (>=80% RDA)	19.0	± 4.7	11.5	± 1.4	5.6	± 2.3	9.0	± 5.1
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9
Energy intake adequacy (aged 55 y.o)								
Poor (< 80% RDA)	18.0	± 3.1	11.5	± 1.4	5.7	± 2.3	8.9	± 4.9
Adequate (>=80% RDA)	18.0	± 3.6	11.5	± 1.4	5.8	± 2.3	8.6	± 4.9
Total	18.0	± 3.2	11.5	± 1.4	5.7	± 2.3	8.8	± 4.9

Table 3. Contd.

Fat intake (aged 25 y.o.)	26.0	± 21.2	28.7	± 19.7	27.6	± 22,7	27,7	± 21,7
Fat intake (aged 55 y.o.)	28.1	± 21.9	29.3	± 21.6	29.5	± 22,2	29,2	± 21,9

RDA: Recommended dietary allowance. SD: standard deviation.

Table 4. Correlation between BMI, weight, height, fat and energy intakes (aged 25 and 55 years old) with visceral fat.

Variable	Visceral fat
BMI	r = 0.896 p = 0.001*
Weight	r = 0.874 p = 0.001*
Height	r = 0.118 p = 0,001*
Fat intake (aged 25 y.o.)	r = 0.034 p = 0.339
Fat intake (aged 55 y.o.)	r = 0.060 p = 0.085
Energy intake (aged 25 y.o.)	r = 0.090 p = 0.792
Energy intake (aged 55 y.o.)	r = 0.220 p = 0.523

*Significance level at $p < 0.05$.

areas with visceral fat level due to fat intake, cholesterol level, and physical activity level differences. The urban elderly had higher fat and cholesterol intakes during young and old age and lower fiber intake compared to the rural elderly. Gender plays a role in determining the proportion of visceral fat level. The prevalence of high visceral fat level was found more in male elderly compared to female elderly. This finding was in line with the theory from Mitchell et al. (2003) which stated that male had more visceral fat compared to female. Females who have

Table 5. Mean of visceral fat according to group of height, weight and gender .

Anthropometric indicator	Visceral fat	
	Male	Female
Height (cm)		
< 150	7.52 ± 4.13	8.50 ± 4.88
150.1 - 160	9.20 ± 4.77	8.85 ± 4.84
160.1 – 175	9.58 ± 5.02	9.29 ± 5.59
Weight (kg)		
30 – 40	2.27 ± 1.62	2.67 ± 1.62
40.1 – 50	5.04 ± 2.28	5.53 ± 2.01
50.1 – 60	8.28 ± 2.60	8.40 ± 2.41
> 60	13.83 ± 3.89	14.26 ± 4.52

Table 6. Multiple regression analyses of mean visceral fat based on urban, male, and high education.

Independent variable	B	S. E.	P Wald	OR	95.0% C. I. OR	
Urban	0.6398	0.1673	0.0001	1.8961	1.3660	- 2.6320
Male	0.4986	0.1712	0.0036	1.6465	1.1772	- 2.3028
High education	0.6556	0.1615	0.0000	1.9264	1.4036	- 2.6439
Workload aged 55 y.o.	0.8306	0.2097	0.0001	2.2947	1.5214	- 3.4610

experienced menopause tend to have increased visceral fat due to reduced physical activities reducing amount of energy expenditure and less estrogen hormone (Lovejoy, 2008). However, females keep more fat in abdominal subcutaneous area, while males aged more than 60 years old tend to keep fat in visceral part. The excess of fat in male tends to accumulate in the upper abdomen. In female, the favoured sites for the accumulation of fat are the buttocks, hips and thighs (Bose,1995).

Early and older elderly groups did not have different level of visceral fat because physical activities and fat intake differences were not big. Visceral fat will increase until 60 years old and it keeps decreasing with reduced physical activities. Visceral fat mass can be lowered by routine and regular exercise (Krishna, 2010). The proportion of high and approaching high level visceral fat on high education group were higher than the lower education group. The result of this study was against that of the study on Spanish elderly which revealed that there was correlation between educational background and central obesity prevalence (Enrique et al., 2006). The result of study was supported by Mexico study which revealed that visceral fat level was affected by daily physical activities (Ono et al., 2002). Work status reflected ability to buy nutritious food such as fruit, vegetables, and low fat milk which were more expensive than less nutritious food. The findings of this study showed that energy and fat intakes had no significant association with visceral fat. It was not in line with the results of Hispanic obese elderly eating pattern study (Hai et al., 2003). Weight correlated with visceral fat because weight may be one of the components to determine body fat level. Therefore, increasing weight will increase visceral fat concentration (MOH, 2003). The strongest correlation was found in BMI indicator and weight towards visceral fat. This finding contradicts the study of body fat percentage and BMI variations on Spanish elderly (Lusine et al., 2003) and study done in 97 elderly male (Santana et al, 2001). Secondly, the study stated that body composition changes with age, with increases in fat mass and visceral fat. However, the study was in line with the two studies abroad. The first study was on the adiposity assessment for assessing abnormality in English (Goya et al., 2005) and the second study stated that BMI and waist circumference play a role in assessing visceral fat in male and female elderly (Janssen et al., 2002).

Conclusion

Urban and rural areas, educational background, physical workload when aged 25 and 55 years, and physical activities aged 25 and 55 years were the risk factors to get high level of visceral fat with physical workload as the main determinant.

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Full Length Research Paper

Perception on bioecology of onchocerciasis vectors around Osun River, Southwestern Nigeria

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Human onchocerciasis still remains one of the public health problems in Africa despite the colossal resources committed by International organizations in combating its menace in the affected communities. The burden of the disease is intense mostly around the riverine areas where the Simulium vectors of the disease profusely breed. The proper knowledge of the communities on bioecology of the Simulium vectors is imperative towards planning the effective methods of breaking man-fly contact. As part of longitudinal studies on bioecology of black flies along Osun River, the present study utilized structured questionnaires and focus group discussions to assess the perception of the people on bioecology of black flies in three selected communities around the river. All the respondents at the three communities acknowledged that the blackflies bite in their communities but had poor knowledge of the breeding site of the flies as majority of the respondents at Osun Eleja and Osun Budepo (33 and 58%) claimed that the flies breed in tree-holes as compared with stagnant water and flowing river. Though, most of the respondents knew that black flies transmit disease, only 2, 5 and 11% of the respondents at Osun Budepo, Osun Eleja and Osun Ogbere respectively knew that black flies transmit onchocerciasis. The poor knowledge of the respondents on some aspects of bioecology of the flies poses threat to the effective control of onchocerciasis and black flies nuisance at the study communities. There is therefore need for proper health education in order to stem the risk of man-fly contact at the study area.

Key words: Black flies, perception, onchocerciasis, Osun River, Nigeria.

INTRODUCTION

Human onchocerciasis caused by *Onchocerca volvulus* is a severely debilitating disease of major public health problem in many riverine communities of Africa where the black fly vector of the disease abundantly thrive (Post et al., 2003; Adeleke et al., 2010). Onchocerciasis is known to be endemic in many tropical countries and over 37 million people are infected worldwide. About 90 million people are at the risk of the disease. Onchocerciasis is most common in Africa and Nigeria probably has the highest burden of the disease (Oyibo and Fagbenro, 2003).

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Nine sibling species of *Simulium damnosum* complex have been taxonomically identified and documented in West Africa. The species include *Simulium sirbanum, S. damnosum sensu stricto, Simulium dieguerense, Simulium sanctipauli, Simulium soubrense, Simulium squamosum, Simulium yahense, Simulium leonense, Simulium konkorense* (Ibeh et al., 2006). The first three species are known as savanna flies which transmit savanna strain of *O. volvulus* while the rest belong to the forest group and transmit the forest strain of the parasite which causes more of skin disease than blinding disease (Mafuyai et al., 1996; Ibeh et al., 2006).

After successful transition from vector to chemo-therapy, the control of human onchocerciasis in Africa is currently implemented through regimental distribution of

ivermectin by African Programme for Onchocerciasis Control (APOC) (Hodgkin, 2007; Opara et al., 2007). As APOC is gradually preparing to wind-up the activities, the intense biting of the black flies without protection threatens the possibility of recrudesce, even in areas where ivermectin distribution had been successful since the drug does not kill the adult worms. Apart from the fear of recrudesce, the biting nuisance of the *simulium* flies also imposes colossal socio-economic burden on the affected communities (Adeleke et al., 2010). Therefore, an understanding of the perception of the local communities on *Simulium* flies is important towards breaking-man flies contact and thus, minimizing the risk of disease trans-mission and recrudesce. The present study evaluates the perception of three communities on bioecology of onchocerciasis vectors around Osun River, Southwestern Nigeria

MATERIALS AND METHODS

The study area

The study was conducted along Osun River system, Southwestern Nigeria. River Osun lies on the latitude 8° 20' and 6° 30'N and longitude 5°10' and 3° 25'E in the forest zone of Nigeria. Three catching points; Osun Eleja (derived savanna), Osun Budepo (rainforest) and Osun Ogbere (rainforest) were selected along the river course. The details of the study communities had been given in Adeleke et al. (2010b).

Ethical clearance

Written consent was sought and obtained from the Ogun State Ministry of Health before the commencement of the study. Informed consent was also sought and obtained from the communities and subjects used for the study.

Data collection

Structured questionnaires were used for data collection on the perception of the communities on bioecology of onchocerciasis vectors. The questionnaires were complemented with focus group discussion (FGD). The questionnaires which comprised open-ended and closed- ended questions were administered to each participant in each of the three communities. Only participants above 15yr were included in this study. The questions sought information on the age, sex, occupation, knowledge on the fly density, seasonal variation, disease caused by the black fly, protection methods against black flies among others. The questions for focus group discussion contained unstructured questions which sought information on general knowledge of the residents on bio-ecology, attitudes and practice of the residents against black flies. Three group discussions comprising 5 to 7 participants were held in each community. The groups were old men, old women and the youths

Data analysis

The questionnaires were analyzed using Epi- Info software version 6.04 and the results were expressed in percentages.

RESULTS

A total of 117 respondents were interviewed at the three communities. Most of the respondents in Osun Budepo (75%) and Osun Ogbere (63%) were males while females participated more (58%) than males (42%) at Osun Eleja. The majority of the respondents did not have any formal education at Osun Eleja (71%) and Osun Budepo (69%) while most of the respondents at Osun Budepo either had primary school (33%) or secondary school education (37%). Farming was the predominant occupation at the three sites which constituted 84, 90 and 81% of the respondents' occupation at Osun Eleja, Osun Budepo and Osun Ogbere respectively.

The knowledge of the respondents on bioecology of black flies is summarized in Table 1. All the respondents at the three communities acknowledged that the blackflies bite in their communities but differed as to the place of bite of *S.damnosum s.l.* Majority of the respondents at Osun Eleja (37%) believed that blackflies bite mostly at the farm sites relative to riverside (34%) and any other part of the community (24%). Most of the respondents at Osun Budepo (48%) were of the opinion that black flies bite in every part of the community while 32, 2 and 15% believed that blackflies bite more at the farm sites, riverside and village respectively. Similar observations were also recorded at Osun Ogbere with majority of the respondents (59%) believed that blackfly bite can be received in any part of the community.

The majority of the respondents are of opinion that black flies are abundant during the wet season, 11% in the dry season and 13% in both seasons at Osun Eleja and Osun Budepo respectively. Whereas, every respondent in Osun Ogbere agreed that blackflies bite only in wet season. The opinions of the respondents were also corroborated during focus group discussions with most of the groups agreeing that black flies bite throughout the day but more in the morning and evening than afternoon. All the groups agreed that blackflies were problems during the wet season alone and almost disappear during bush burning in the dry season. All the respondents and focus group discussions also believed that black flies constitute nuisance and greatly affect their productivity.

Most of the respondents at Osun Eleja (39%) and Osun Budepo (54%) believed that blackflies breed in tree holes relative to flowing and stagnant water. However, the majority of the people at Osun Ogbere believed that blackflies breed in flowing water followed by tree- holes (19%) and stagnant water (11%). Only 7% did not know their breeding sites. The responses of all the focus group discussions held at Osun Eleja and Osun Budepo were also consistent with the claim of the residents that black flies breed in tree holes. Itching/scratching and malaria/ headache are the common effects of the black fly bite acknowledged by most of the respondents. Only 5% (Osun Eleja), 2% (Osun Budepo), 11% (Osun Ogbere)

Table 1. Summary of the knowledge of the respondents on bioecology of *Simulium damnosum* complex at the study sites.

Parameter	Osun Eleja	Osun Budepo	Osun Ogbere
Sex			
Male	42	75	63
Female	58	25	37
Educational status			
Primary	26	25	33
Secondary	3	6	37
Others	0	0	11
No formal education	71	69	19
Preferred biting site			
Farm	37	48	22
River side	34	32	8
Village	5	5	11
Any place	24	15	59
Biting period			
Morning	21	29	15
Afternoon	13	0	11
Evening	5	31	0
Anytime	61	40	74
Biting seasons			
Dry season	0	0	0
Wet season	90	87	100
Both	10	13	0
Preferred biting parts			
Leg	74	83	89
Any exposed part	26	17	11
Breeding sites			
Tree holes	40	54	19
Stagnant water	1	6	11
Flow water	29	3	63
Not known	30	37	7
Effect of fly bite			
Hitching/scratching	68	77	74
Blindness	5	2	12
Malaria	11	19	7
Headache	14	2	7
Others	2	0	0

Values are presented in percentages.

attributed blackflies to blindness. During focus group discussion, the majority argued that blindness is mostly caused by witchcraft or old age.

Most of the respondents usually have close contact with River Osun to fetch water for domestic uses (Table 2). Moreover, 21% (Osun Eleja), 21% (Osun Budepo) and 7% (Osun Ogbere) normally visit the river for bathing. Only few respondents visit the water for fishing, and sand dredging was common at Osun Ogbere alone (33%). The residents at Osun Budepo and Osun Eleja said they solely dependent on River Osun because it is the only river available for their domestic use, while the

Table 2. Human activities of the respondents around Osun River at the study area.

Communities	Fetching	Fishing	Bathing	Washing	Sand dredging
Osun Eleja	45	8	21	26	0
Osun Budepo	35	2	21	42	0
Osun Ogbere	35	7	7	11	33

Values are presented in percentages.

Table 3. Methods of prevention of *S. damnosum s.l* bites by the respondents at the study communities during the period of the study.

Communities	Covering the body with cloth	Using cream	Rubbing plant extract	Rubbing other chemicals	No protection Method
Osun Eleja	50	5	8	29	8
Osun Budepo	75	6	4	4	0
Osun Ogbere	67	19	4	11	0

Values are presented in percentages.

residents at Osun Ogbere said they only utilized the river during the dry season, there are bore holes and wells for water supply during the wet season.

Table 3 shows the responses of the residents on the methods of prevention of blackfly bite. At the three communities, 50, 75 and 66.7% of the respondents normally wear clothes that cover their body during the peak of black fly bite at Osun Eleja, Budepo and Ogbere respectively. Some respondents also used chemicals like the mixture of diesel oil, kerosene and palm oil, body lotion and plant extracts as repellants. The orange lime, *Ocimum spp* and orange peel were the common plant repellants used in the study communities. When asked on the prevention of black flies during focus discussion, majority of the people including females said that they normally wear long sleeve shirts and long trousers to cover themselves. The respondents opined that the use of kerosene as repellent is irritating and harsh to the skin.

DISCUSSION

The evaluation of the perception of the three communities on bioecology of the black flies showed that the residents are conversant with the black fly bite. The impressive knowledge of the participants that *S. damnosum* bite mostly along the river course or farmland close to the rivers corroborates the scientific findings that people working close to the rivers are at the high risk of *Simulium* biting nuisance and onchocerciasis (Akogun and Onwuliri, 1991; Abdullahi and Oyeyi, 2003). Avoiding such high biting areas of *Simuliium* is important in controlling onchocerciasis, as it will help to reduce man-fly contact. However, despite their knowledge of the high biting areas, the residents solely depend on the river for some domestic activities and occupational demands. These frequent exposures to *Simulium* biting areas portend the high risk of the residents to onchocerciasis.

The knowledge of the residents at the study communities that blackflies bite more during the wet season and preferred lower limbs than any other exposed parts is in agreement with the biting behaviours of *S. damnosum s.l* earlier observed at the study communities (Adeleke et al., 2010b). However, the poor knowledge of the residents at Osun Budepo and Osun Eleja on the breeding sites of *S. damnosum s.l* is worrisome having recognized that *S. damnosum s.l* bites more around the river course. The poor knowledge of the endemic communities on the ecology of *S. damnosum s.l* had also been documented in many parts of Nigeria (Anosike and Onwuluri, 1995; Ukpai and Ezeji, 2003; Dozie et al., 2004). The poor knowledge of the residents on the breeding sites of *S. damnosum s.l* could increase their risk to onchocerciasis as majority of the residents did not have accurate knowledge of their breeding sites. The relatively high knowledge of the breeding sites of black flies recorded at Osun Ogbere may not be unconnected to the high level of education of the residents and their closeness to semi urban areas such as Ogbere Township and Ijebu Ode.

The large proportion of the residents attributed hitching/scratching to black flies bite. Some even confessed to the use of hard materials such as stones and sticks to scratch their body after being bitten by black flies. Hitching is one of the recognized early manifestations of onchocerciasis and could in many severe conditions, lead to skin lesions and disfigurement in affected individuals (Adewale et al., 1999; Ukpai and Ezeji 2003).

The failure of most of the respondents to associate *Simulium* bite to blindness at Osun Eleja and Osun Budepo showed that the residents of the community need

public health enlightenment on the consequences of black flies bite. Instead of blindness, some respondents associated malaria to black flies bite but linked blindness to the handiwork of witch crafts. Moreover, despite the relatively high level of awareness on onchocerciasis claimed by the residents of Osun Ogbere, only few people could link blindness to *Simulium* bite, many respondents still believed that blindness is a result of old age and witchcrafts. This wrong perception could serve as retardation in achieving effective control programme.

The wearing of long garments and socks as a means of protection against *S. damnosum* bite is a welcoming idea as this will reduce the risk of man-fly contact. However, despite these wide affirmations by most of the respondents at the study communities, some residents were observed wearing only knickers, the practice that is common among the farming population at the three sites and sand-dredgers at Ogbere. Their reasons for this habit were premised on the fact that the shirts normally disturb them at work and sometimes cause excessive heat. This behavioural habit is dangerous as this could enhance the risk of disease transmission. The resort of the residents to the use of chemical compounds, such as mixture of kerosene, palm oil and diesel is of great economic burden since these products are meant for domestic use.

The rubbing of the extract of *Ocimum* leaves, lime and orange bark by few respondents in the study communities could be a good omen at man-fly contact. The extracts of the three plants mentioned by the residents have produced promising results when used as protectants and repellants against insects (Don-Pedro, 1985, Usip et al., 2006). According to Usip et al. (2006), the uses of *Ocimum spp* conferred over ninety percent protection against black flies and repel the infected flies in the test subjects in an endemic area.

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Full Length Research Paper

Concurrent sexual partnerships among Chinese men: Evidence from a national population-based survey

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We sought to determine the pattern of the concurrent sexual partnerships among Chinese men and its correlates with individual, partnership and community factors. Using data from the Chinese Health and Family Life Survey, we examined the prevalence and distribution of sexual concurrency of 1689 men. A two-level logistic regression was employed to assess variables associated with sexual concurrency. Nine percent of men had concurrent sexual partnerships in preceding year. Sexual concurrency was associated with higher income (OR, 1.21; 95% CI, 1.02 to 1.48), longer traveling time (OR, 2.03; 95% CI, 1.44 to 2.87), and more frequent socializing activities (OR, 1.15; 95% CI, 1.01 to 1.30). Men who perpetrated domestic violence (OR, 1.92; 95% CI, 1.20 to 3.08) and perceived partners having other concurrent partners (OR, 4.19; 95% CI, 1.95 to 9.02) were more likely to have concurrent sexual partnerships. Tolerant community attitude towards sexual behavior and community education level showed effects on men's concurrency involvement. The results contribute to a better understanding of the potential role of concurrent sexual partnerships in the spread of HIV and other STIs in China.

Key words: Concurrent sexual partnerships, risk factors, human immunodeficiency virus prevention, Chinese men.

INTRODUCTION

The HIV/AIDS epidemic in China appears to spread from high risk groups such as injection drug users, blood donors and sex workers to the general population through heterosexual transmission. Heterosexual infection has now become the dominant mode of transmission (Wang et al., 2009) with the acquisition of sexually transmitted HIV tripling from 2005 to 2007(Lu et al., 2008). Therefore, a better understanding about sexual risk behaviors of the Chinese population should be warranted to guide the HIV prevention efforts. Compared with other risk sexual behaviors (Ma et al., 2002; Liu et al., 2005; Zhang et al., 2007), concurrent sexual partnership in China has been rarely studied, although its association with the increased risk of HIV infection and other sexually transmitted infections (STIs) has been demonstrated by mathematical modeling (Watts and May, 1992; Doherty et al., 2006) and empirical studies (Mishra and Assche 2009; Mah and Halperin, 2010). The existing studies largely remain limited to African and American population. For example, using the 2002 United States National Survey of Family Growth data, one study showed that 11% of adult men had concurrent partnerships in the preceding year and marital status and race were strongly related to the sexual concurrency (Adimora et al., 2007). Other studies in Africa also demonstrated that a large proportion of women and women reported sexual concurrency (Carter et al., 2007; Mattson et al., 2007).

In this study, we utilized the data from the Chinese Health and Family Life Survey to determine the pattern of concurrent sexual partnership among Chinese men as

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well as its risk factors from a multilevel perspective: individual, partnership and community level. We focused on men rather than women because the reported prevalence of concurrent sexual partnerships among the latter is relatively low.

METHODS

Data

The Chinese Health and Family Life Survey conducted in 1999 to 2000 was the first and only nationally probability survey thus far which focuses on sexual life and behaviors of Chinese adults. It covered the adult population aged 20 to 64 years from China mainland except Tibet and Hong Kong. Using a multi-stage sampling approach, the survey sampled 5000 respondents, of whom 3766 completed the interview yielding a response rate of 75.3%. The survey instrument primarily focused on sexual behavior and sexual partnerships of respondents. The survey used computer technology to interview respondents in a private place, away from the respondent's home. Interviews were initiated and led by interviewers who obtained oral and computer-entered consent from respondents. Then, respondents obtained control of the interview and continued the survey in the computerized format. However, about 13% (often older women in the countryside) needed continued assistance throughout the interview. More information about the survey can be found in previous studies (Parish et al., 2003, 2007).

Definition of concurrent sexual partnership

There is no consensus on the definition of concurrent sexual partnership. It has been measured in variety of ways in different studies. Some studies have identified concurrent sexual partnerships through collecting information on the date of first and last sex encounters with different partners (Morris and Kretzschmar, 1997; Lagarde et al., 2001). This method can be burdensome and is also prone to misclassification, as well as underreporting (Manhart et al., 2002). Defining concurrent sexual behavior as having an extra sexual partner beyond a primary partner like a spouse (Jennings et al., 2004) could also result in misclassification of some who do not have sex at all with their primary partner, therefore rendering the sexual relationship with their extra partner as non-concurrent. Directly asking respondents whether they have more than one sex partners during a certain period (Daker-White and Barlow, 1997; Colvin et al., 1998) is easily implemented, however this method may have recall limitations. In this study, we defined one having concurrent sexual partnerships if he had other sexual partners while keeping sexual activity with the primary sexual partner in the last 12 months. The primary sexual partner was a current spouse for married respondents and for those respondents who were not married, the most intimate partner with more than 6 months of sexual relationship. Clearly this measurement of concurrent sexual partnerships is conditional on one having a primary partner. Hence, only men (90% of total sample) who reported having a primary partner were included in this analysis.

The identification of sexual concurrency in this study was computed based on the respondents' self-report to several questions. For example, respondents were asked about the sexual activities with their current primary partner:

"In the past 12 months, how often did you and your current primary partner have sex?" Options are provided as:

1) Once a day or more
2) 3 to 6 times a week
3) 1 to 2 times a week
4) 2 to 3 times a month
5) Once a month or less

If a respondent selected options from option 1 to 4, this indicates that this person was sexually active on a regular basis or every month with his primary partner during the last 12 months. Respondents were also asked the time of last sexual encounter with partners other than the primary partner, which included the most recent long-term sexual partner (having at least one month of sexual relationship) and the most recent short-term sexual partner (having less than one month of sexual relationship). If his last sex with long-term extra partner or short-term partner occurred during the last year, he was considered to have concurrent sexual behavior. Moreover, among those who did not report regular monthly sexual activity with their primary partner, one would be considered to have concurrent sexual partnerships if he responded that his last sex with both a primary partner and an extra partner (either long-term or short-term) happened during the last month.

Independent variables

This study attempted to identify risk factors of concurrent sexual behavior at multiple levels including individual, primary partnership and community levels. This was based on the ecological framework that directs the attention to multilevel determinants of health behavior (McLeroy et al., 1988; Stokols, 1992). Individual demographic and social behavioral variables such as time away from home due to travel and frequency of socializing activities were included. The respondent's primary partnership characteristics included marital status, partnership duration and partnership discordance in social characteristics such as age, income and education. Psychological aspects such as perception of partner's infidelity and domestic violence were also included. At the community level, the survey sampling subunit-village or urban neighborhood was defined as the "community" through which the social context is hypothesized to operate to influence individual's behavior. The contextual factors of particular interest in this study were community socio-economic level and prevailing social attitudes towards premarital and extramarital sex. Community variables were generated from individual level data. Table 1 presents the operational definitions of all variables included in the model.

Analytical models

Both descriptive analyses and multivariate modeling were used with the effect of a complex survey design adjusted in both analyses. In the multivariate analysis, we used the two-level logistic modeling: individual level and community level. Primary partnership characteristics were treated as individual level variables. Compared with regular individual level regression analyses that assume all individuals are independent, the multilevel modeling approach considers the clustering effect among people who live in the same community and may share similarities. It also allows the simultaneous investigation of the effects of group-level and individual-level variables on individual level outcomes (Stephenson and Tsui, 2003). Preliminary analysis showed the intra-class correlation coefficient (ICC) of having concurrent sexual partnerships is 0.07, which indicates a clustering effect at

Table 1. Definitions of independent variables included in the model.

Variables	Operational definition
Individual	
Age	Actual age in single year, range 20 to 64.
Education	Three categories: no schooling/primary, high school and college or higher.
Income	Log transferred individual monthly income in RMB.
Occupation	Four categories from farmers to self-employed/ business managers.
Migration status	Four categories from permanent resident to migrate here for less than 1 year.
Time away from home due to travel	In the last 12 months, away from home due to travel on own regardless of reason (only overnight stays count, nigh shifts or staying overnight at relatives' place don't count).
Frequency of socializing activity	In the past 12 months, how often the respondent participants in social activities after work (excluding activities with families or relatives).
Primary partnership predictors	
Marital status	Currently married vs. single/divorce/widow.
Partnership duration	Number of full years since the first sex with the primary partner, range: 0 to 48.
Age gap	Age difference between respondent and primary partner.
Income gap	Difference between log current monthly income between respondent and primary partner.
Education gap	Difference between respondent's education level and primary partner's education level.
Perceived partner unfaithful	Respondent perceived that primary partner had ever have sex with other people at any time throughout the sexual relationship even if it happened just once.
Domestic violence	It is defined as have beaten primary partner in the last 12 months for whatever reason (not including in a joking or playful way).
Community context*	
Community education level	The median of individual education level within the community.
Community income level	The median of individual's log current monthly income within the community.
Community attitudes towards premarital sexual behavior†	Mean score of agreement on premarital sexual behavior, higher score indicates more tolerant attitudes.
Community attitudes towards extramarital sexual behavior†	Mean score of agreement on extramarital sexual behavior, higher score indicates more tolerant attitudes.
Residence	Present locale of residence: urban or rural.
Region	Coastal or non-coastal area: the coastal area includes counties close to east and south coast where the economic is more developed than the national average.

*Both women and men's data were used to generate community variables. †Community attitude towards premarital sex is constructed based on the individual response to the question "Do you agree 'As long as two people eventually get married, it doesn't matter whether they have sex before they marry'?" Answer of yes is scored 1, no is score zero. The average score of the community is used to measure the community attitude towards premarital sex. The variable of community attitude towards extramarital sex is generated in the similar way based on the response to the question "Do you agree 'it is okay to have sex with someone other than your spouse after marriage'?"

community level and thus justifies the use of multilevel modeling. We allowed for the random intercepts across communities and assumed constant effects of variables across communities. The model equation was expressed as shown as follows:

$$Log\ (\frac{P_{ij}}{1-P_{ij}}) = \beta_0 + \beta_1 X_{ij} + \beta_2 \mathrm{Pr}_{ij} + \beta_3 C_j + \mu_{0j}$$

$$\mu_{0j} \sim (0, \tau_{00})$$

P_{ij} represented the probability of engaging in concurrent sexual behavior for i^{th} individual in j^{th} community. X_{ij} and Pr_{ij} represented a vector of individual variables and primary partnership

variables corresponding to the *ith* respondents in the *jth* community; C_j represented a vector of covariates at the community level. Respectively, *β's* represented the fixed coefficients of all predictors. μ_{0j} was the random effect part that indicated the variation across the communities, assumed to be normally distributed with mean zero and variance τ_{00}. The significance of community random effect indicates that the community environment is playing a role after adjusting for the individual and partnership level predictors.

Two nested analytical models were built, with model I including individual and primary partnership variables, and model II having community variables added in. This approach allowed us to assess the relative contribution from each set of covariates. This study was reviewed and approved by the Committee on Human Research at the Bloomberg School of Public Health, Johns Hopkins University.

RESULTS

Socio-demographic characteristics of respondents

Of the men who completed the interview, 1689 who reported having primary partners were included in the analysis. The distribution of sample in demographic characteristics and social behaviors are presented in Table 2. The average age of men in the study was 41 and almost all were married. About two-thirds of men obtained an education of high school, college or higher. These men had diverse occupations, with 22% self-employed or managing businesses. About 5% of men were migrants, of whom half lived in their currently locality for more than 5 years. One in five men reported that they left home for more than 1 week due to travel during the last 12 months and about one third of respondents reported a frequency of socializing once or more than once per week.

Prevalence of concurrent sexual partnership and variations by socio-demographic and behavioral factors

Table 3 shows the prevalence of concurrent sexual behavior by socio-demographic and behavioral characteristics. Overall, 9 men (95% CI: 6.5 to 11.6%) in every 100 population reported having been involved in concurrent sexual partnerships in the last 12 months. The prevalence varied by age group and urban/rural residence. Men aged 30 to 39 appeared to be at the most risk of having concurrent sexual partnerships, followed by men aged 20 to 29. About 15% of men in urban sites reported concurrent sexual behavior, compared with about 7% in rural sites. Bivariate analysis also showed that a higher prevalence of concurrent sexual partnership was found among men who had higher education, higher income, were not currently married, were self-employed/business managers, were non-permanent local residents, resided in coastal areas, socialized more frequently and had been away from home for longer time.

Adjusted effects of predictors on involvement of concurrent sexual partnerships

The analytic models were built with individual level and community level variables added sequentially. Table 4 displays the results of both models. The first model shows that younger age, earning higher income, being away from home due to travel for more than one week and engaging more frequent socializing activities were risk factors for having concurrent sexual partnerships within the last 12 months. Individual education level, occupation and migration status, however, were not associated with having concurrent sexual partnerships. Men who perceived their partner to have other concurrent partners and who perpetrated domestic violence to his partner were more likely to engage in the concurrent sexual partnerships. Partnership types, partnership duration, as well as the discordance in age, education and income between partners did not show any significant association with sexual concurrency. The community level random effect was statistically significant ($p = 0.003$), which indicated that other factors that influence clustering of the outcome at community level were omitted in this model.

Model II added the community level variables. All of the significant individual and primary partnership predictors in the model I remained significant. Men who earned a higher income (OR, 1.21; 95% CI, 1.02 to 1.48), had been away from home due to travel for more than one week (OR, 2.03; 95% CI, 1.44 to 2.87), and had more frequent socializing activities (OR, 1.15; 95% CI, 1.01 to 1.30) were more likely to have concurrent sexual partnerships in the last 12 months.

Perceiving the primary partner to have other concurrent partners (OR, 4.19; 95% CI, 1.95 to 9.02) and having perpetrated domestic violence to his partner (OR, 1.92; 95% CI, 1.20 to 3.08) were associated with having concurrent sexual partnerships. A more permissive community attitude towards extramarital sexual behavior was shown to be associated with men's higher likelihood of engaging in concurrent sexual partnerships (OR, 1.12; 95% CI, 1.05 to 1.20). While individual educational attainment was not associated with involvement in sexual concurrency, the education at community level was (OR, 0.57; 95%, 0.40 to 0.81). People who live in a better-educated community were protected from engaging in the concurrent sexual behavior. Living in coastal or urban area was associated with having concurrent sexual partnerships. The community economic level does not show a significant effect, though the individual income level matters. The clustering effect in the final model dropped and was no longer significant, which means by

Table 2. Socio-demographic characteristics of respondents.

	Number of men	Weighted percent (%)
Age		
20 to 29	256	19.0
30 to 39	578	28.6
40 to 49	505	26.5
50+	350	25.9
Education		
No school or primary school	283	34.4
High school	1134	60.6
College or higher	272	5.2
Individual monthly income[1]		
Low	716	68.7
High	973	31.3
Occupation[2]		
Farmers	183	41.0
Manual/serv/tech/prof	835	26.8
Clerica/admin/others	340	10.7
Self-employed/business managers	331	21.5
Migration status		
Permanent resident	1387	94.7
Migrate here for more than 5 years	117	2.5
Migrate here for 1 to 5 years	114	1.8
Migrate here for less than 1 year	71	1.0
Time away from home due to travel		
One week or less	1300	80.5
More than one week	389	19.5
Frequency of socializing activity		
Less than once per week	1016	67.3
Equal or more than once per week	673	32.7
Marital status		
Married	1595	96.8
Single/divorce/widows	94	3.2
Region		
Non-coastal area	969	88.7
Coastal area	720	11.3
Residence		
Urban	1341	29.7
Rural	348	70.3
Total	1689	100.0

[1]The low income means the half below median, high income means the half above median (income was log transferred). [2]Manual/serv/tech/prof refer to manual worker, sales, service, entertainment industry worker, technical worker, teacher, professional technical worker; Clerica/admin/others refer to clerical worker, low-rank bureaucrat, office worker and others.

Table 3. Prevalence of concurrent sexual partnerships among Chinese men by socio-demographic and behavioral characteristics.

	Prevalence (%)	95% CI
Age		
20 to 29	12.0	3.2 to 20.8
30 to 39	17.5	10.2 to 24.7
40 to 49	4.5	1.9 to 7.1
50+	2.3	0.8 to 3.7
Residence		
Urban	14.8	11.7 to 17.9
Rural	6.6	3.3 to 10.0
Education		
No school or primary school	5.4	1.0 to 9.9
High school	11.0	7.7 to 14.4
College or higher	10.5	4.2 to 16.8
Monthly income		
Low	6.9	3.7 to 10.0
High	13.9	9.6 to 18.2
Occupation		
Farmers	4.4	0.4 to 8.5
Manual/serv/tech/prof	8.9	6.0 to 11.9
Clerica/admin/others	14.8	5.2 to 24.4
Self-employed/business managers	15.3	8.7 to 21.8
Migration status		
Permanent resident	9.1	7.0 to 11.1
Migrate here for more than 5 years	17.4	2.3 to 32.5
Migrate here for 1 to 5 years	21.1	10.3 to 31.8
Migrate here for less than 1 year	11.3	5.4 to 17.3
Time away from home due to travel		
One week or less	6.2	4.0 to 8.4
More than one week	20.8	12.0 to 29.7
Frequency of socializing activity		
Less than once per week	6.1	3.2 to 8.9
Equal or more than once per week	15.2	10.1 to 20.3
Marital status		
Married	8.6	6.0 to 11.2
Single/divorce/widows	23.4	8.0 to 38.9
Region		
Non-coastal area	7.4	4.7 to 10.2
Coastal area	21.9	15.9 to 27.8
Total	9.1	6.5 to 11.6
N	1689	

Table 4. Results of multilevel modeling of concurrent sexual partnership in the last 12 months among Chinese men.

	Model I	Model II
	Odds ratio (95% CI)	**Odds ratio (95% CI)**
Individual variables		
Respondent's age	0.94(0.89 to 0.98)**	0.94(0.89 to 0.98)**
Education attainment		
No school or Primary school	1.00	1.00
High school	1.39(0.76 to 2.53)	1.51(0.83 to 2.75)
College or higher	1.39(0.63 to 3.08)	1.57(0.71 to 3.50)
Income	1.22(1.01 to 1.48)**	1.21(1.02 to 1.48)**
Occupation		
Not working/farmer	1.00	1.00
Manual/serv/prof	1.42(0.59 to 3.43)	1.22(0.51 to 2.97)
Clerica/admin/others	1.42(0.59 to 3.43)	1.23(0.48 to 3.18)
Self-employed/ managers	2.04(0.88 to 4.71)	1.72(0.71 to 4.19)
Migration status		
Permanent resident	1.00	1.00
Migrate here for more than 5 years	1.42(0.79 to 2.55)	1.43(0.79 to 2.57)
Migrate here for 1 to 5 years	1.28(0.71 to 2.31)	1.30(0.72 to 2.37)
Migrate here for less than 1 year	0.91(0.41 to 2.02)	0.96(0.43 to 2.17)
Time away from home due to travel		
Less than one week	1.00	1.00
Equal or more than one week	1.93(1.36 to 2.74)***	2.03(1.44 to 2.87)***
Frequency of socializing activity		
Less one once per week	1.00	1.00
Equal or more than one per week	1.18(1.04 to 1.33)**	1.15(1.01 to 1.30)**
Primary partnership variables		
Marital status		
Currently married	1.00	1.00
Single/divorce/widowed	0.62(0.31 to 1.24)	0.66(0.33 to 1.30)
Partnership duration	1.03(0.97 to 1.08)	1.02(0.97 to 1.08)
Partnership discordance		
Age gap	1.02(0.95 to 1.10)	1.02(0.95 to 1.09)
Income gap	0.96(0.88 to 1.04)	0.96(0.88 to 1.04)
Education gap	0.84(0.69 to 1.03)	0.83(0.68 to 1.01)
Perceived partner ever had concurrent sexual partners		
No	1.00	1.00
Yes	4.04(1.85 to 8.83)***	4.19(1.95 to 9.02)***
Domestic violence		
No	1.00	1.00
Yes	1.86(1.16 to 3.00)***	1.92(1.20 to 3.08)***
Community variables		
Community education level		0.57(0.40 to 0.81)***

Table 4. Contd.

Community income level		0.47(0.22 to 1.03)
Community attitudes towards premarital sex		1.00(0.98 to 1.02)
Community attitudes towards extramarital sex		1.12(1.05 to 1.20)***
Region		
Non-coastal		1.00
Coastal		1.91(1.24 to 2.94)***
Residence		
Rural		1.00
Urban		1.95(1.04 to 3.65)**
Sigma U	0.504	0.003
Rho	0.07	0.00
p value	0.003	0.496

OR = Odds ratio, 95% CI = 95% confidence interval. Significant level ** p<0.05; *** p<0.01.

considering all included predictors above, the variations μ_{0j} among communities were largely explained.

DISCUSSION

This study shows that concurrent sexual partnership among Chinese men was not uncommon. The prevalence of sexual concurrency in the preceding year, particularly among men in their 20s and 30s, was high and comparable to the prevalence found in American society (Manhart et al., 2002). Using the same data, Parish et al. (2007) also found that a high percentage of these two cohorts reported to have concurrent partners during the relationship with their spouse (Parish et al., 2007). Results of multilevel modeling highlight that the risk factors of sexual concurrency were operating at individual, primary partnership and community levels. The study found that the individual income is positively associated with men's involvement in sexual concurrency. The involvement in concurrent sexual behavior usually requires extra economic expenses so that the higher income secures the better economic affordability. However, this study failed to find the protective effect of individual educational attainment against sexual concurrency. In contrast, education attainment at community level exhibits some positive effects. A better-educated community may protect men through, for example, more positive communication, a more reliable mass media environment and a healthier life style.

In the early 1990s, the Chinese government advocated to "let some people become rich first". This principle along with supportive economic policies has produced a wealthy class in the variety of communities where there is still considerable proportion of poor. These rich community members are often at high risk for many behaviors including risky sexual behaviors, while the protective effect from the community, mentioned above, is not yet in place. Our findings related to education and incomes are consistent with this phenomenon. Occupation has been found to be associated with risky sexual behaviors in China (Wang and Gao, 2000; Rich and Kim, 2002). Long distance drivers, border traders and businessmen who travel more frequently are more likely to exhibit risky sexual behaviors compared with their peers. This study failed to find an association between occupation and the involvement in concurrent sexual behavior after controlling for income, travel and socializing activity. However, our analysis does show that men who were self-employed or managers, had higher income, longer time away from home due to travel, and more frequent socializing activities. All these factors were found to be associated with increased likelihood of concurrent sexual behavior. The association between primary partnership characteristics and sexual concurrency has often been omitted in previous studies. This analysis found that men's concurrent sexual behavior is strongly associated with the perception that their partner has other concurrent partners. This finding has also been noted by other studies (Adimora et al., 2004, 2007), which suggest an intense sexual network within such a population that might allow for the acceleration of the spread of HIV and other STIs.

Domestic violence is the other important primary partnership characteristic associated with concurrent sexual behavior. Given that mounting evidence has shown the correlation between domestic violence and the increased prevalence of HIV among women (Martin and Curtis, 2004; Silverman et al., 2008), this finding may suggest that sexual concurrency is an intermediate factor in the relationship between the domestic violence and

HIV infection. The current study illustrates the importance of contextual influences on men's involvement in concurrent sexual behavior. Besides the effect of community education discussed earlier, the study showed that permissive social attitudes towards sexual behavior in the community are leading men to become involved in sexual concurrency. Therefore, HIV/AIDS prevention efforts may need to involve changing community social norms towards sexual risk behaviors, which in turn may influence the behaviors of individuals. The strength of this study is in using data from a national probability survey hence, the results are more generalizable. It is also one of the very few studies to examine sexual concurrency among Chinese adults.

The study analyses consider multiple perspectives in examining the concurrent sexual partnerships by encompassing individual, primary partnership and community variables. This approach considers sexual behavior as an interactive process grounded in social context, which leads a more thorough understanding of such behavior. While there are a number of study strengths, several limitations need to be considered. The first limitation is that the data used is old. Some results might be subject to changes. However, the Chinese Health and Family Life Survey is the only national probability survey to date focusing on sexual life and behaviors of Chinese adults. We therefore believe that the findings in this article still shed light on the prevalence and risk factors of concurrent sexual partnership and thus contribute to guiding the HIV and other STI prevention efforts in China. The lack of recent data highlights the need for a similar type of data collection in the near future. The second study limitation is the way in which the concurrent sexual behavior is measured, which may lead to underestimating its prevalence. In this study, measuring concurrent sexual partnerships is conditional upon respondents having a primary partner. Therefore, individuals who do not have a primary partner but may keep sexual relationships with several partners (for example short-term partners) during a certain period would be excluded from the study. A previous study has shown that individual who do not have a primary partner have a higher risk to be involved in the concurrent partnerships (Adimora et al., 2002). However, since about 90% of sample reported having a primary partner, we expect that exclusion of study respondents who are involved in sexual concurrency due to this reason was not substantial.

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Full Length Research Paper

The pattern of skin disorders in a Nigerian tertiary hospital

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We analyzed the data of patients with skin disorders attending the Dermatology Clinic of the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Nigeria with the aim of identifying common skin disorders in our community. All patients attending the Dermatology Clinic of the UPTH, Nigeria from January 2005 to December 2008 were included in this retrospective analysis. The medical records of the patients (dermographics, history, physical examination and laboratory investigations) were analysed to ascertain the diagnosis. All patients were evaluated by qualified dermatologists. A total of 1,333 patients attended the Dermatology Clinic of UPTH. There were more females 812 (60.9%) than males 521 (39.1%). More than three quarter of the cases were aged above 16 years while less than a quarter were children below 16 years. Infectious diseases 317 (23.8%), mostly fungal 207 (15.5%) were the most common cause for attendance, followed by dermatitis 207 (15.5%) and pigmentary disorders 98 (7.4%). Preventable skin diseases are common in Port Harcourt, Nigeria. Health education is therefore necessary to curb their spread, reduce the associated morbidity, and improve the health status of the population. Effort should be made to train health workers in the diagnosis and treatment of the more common dermatologic conditions.

Key words: Pattern, skin disorders, infectious diseases, Port Harcourt, Nigeria.

INTRODUCTION

Skin diseases and their complications are a significant burden on the health system of many nations. The World Health Organization's report on the global burden of disease indicated that skin diseases were associated with mortality rates of 20,000 in Sub-Saharan Africa in 2001 (World Health Organization. 2005). In Africa, particularly Nigeria, nutrition is inadequate, environmental sanitation is poor with inadequate portable water supply, all contributing to the burden of skin disease and therefore increasing this figure (Mahé et al., 1998; Doe et al., 2001; Adebola, 2004).

Distribution of skin diseases differs from country to country and even city to city (Mahé et al., 1998; Doe et al., 2001; Adebola, 2004; Hartshorne, 2003). There are several reports (Adebola, 2004; Altraide et al., 2008; Okoro, 1973) on the pattern of skin diseases in different parts of Nigeria with some variations. Some factors like genetic, environment, race, age, occupation, nutrition and habits can influence the pattern of skin diseases (Parthasaradhi and Gufai, 2004). Skin disorders in the tropics are preventable (Doe et al., 2001). Successful management of skin diseases requires accurate diagnosis and prompt treatment. Misdiagnosis will result in wrong treatment and this can subsequently lead to complications such as renal damage.

By undertaking a retrospective survey of skin diseases in this environment, this study hopes to identify the common skin diseases affecting various age groups in our locality and provide accurate baseline data for planning intervention. This will go a long way to improving case management and prevention of skin disorders as applicable to various age groups.

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Table 1. Distribution of skin diseases by age and gender.

Skin diseases	Gender		Age (Years)		Total
	Male	Female	<16	>16	
1. Infections					
a. Parasitic	8	8	9	7	16
b. Fungal	84	123	27	180	207
c. Bacterial	12	16	8	20	28
d. Viral	25	41	13	53	66
2. Dermatitis	80	127	57	150	207
3. Drug eruption	16	21	12	65	77
4. Psoriasis	14	13	7	20	27
5. Pityriasis	11	37	12	36	48
6. Lichen planus	16	45	7	54	61
7. Pruritus/urticaria	33	54	9	78	87
8. Acneform eruptions	27	34	1	60	61
9. Sychosis/folliculitis	16	5	-	21	21
10. Disorders of keratinization	9	13	3	19	22
11. Benign tumours	5	13	1	17	18
12. Pigmentary disorders	51	47	10	88	98
13. Papular urticaria	14	35	34	15	49
14. Phyrnoderma	3	5	6	2	8
15. Bullous diseases	2	2	1	3	4
16. Alopecia	5	18	3	20	23
17. Connective tissue disorder	8	30	2	36	38
18. Neurocutaneous syndromes	9	7	4	12	16
19. Pruritic papular eruption of HIV	15	16	5	26	31
20. Kaposis sarcoma	2	1	-	3	3
21. Erythroderma	6	19	-	25	25
22. Others	50	42	54	38	92

MATERIALS AND METHOD

A retrospective analysis of all the dermatological patients seen in the Dermatology Clinic of the University of Port Harcourt Teaching Hospital (UPTH) over four year period from January 2005 to December 2008 was carried out. In the UPTH, individuals less than 16 years were regarded as children while those above 16 years are adults. The patients were referred from the Medical, Paediatrics, Surgical and General Out Patient Clinics of UPTH. The Dermatology Clinic also receives referrals from all the medical facilities in Rivers, Bayelsa and all the neighbouring states in the Niger Delta of Nigeria. The UPTH is located in Port Harcourt metropolis, the Capital city of Rivers State of Nigeria with a population of 541 115 (National Population Commission, 2006). Ethical approval was obtained from the Ethical Committee of the UPTH.

Data obtained from the medical records of the patients included age, gender, clinical and laboratory features, diagnosis and treatment. All the patients were seen and examined by dermatologists who confirmed all the diagnoses by clinical, laboratory and sometime by punch biopsy for histology, skin scrapping for mycology, skin snip for microscopy. Skin slit, smear and Ziehl-Nelson stain were also carried out for acid fast bacilli. The statistical package for social sciences (SPSS) Version 14 was used to enter data and descriptive statistics in the form frequency distribution tables and percentages were used for the analysis.

RESULTS

A total of 1,333 patients attended the Dermatology Clinic of UPTH, Nigeria within the period under review. There were more females 812 (60.9%) than males 521(39.1%). One thousand and forty eight (78.6%) of the cases were aged above 16years while 285 (21.4%) were children below 16 years (Table 1).

Infectious diseases 317 (23.8%) were the most common cause for attendance, followed by dermatitis 207 (15.5%) and pigmentary disorders 98 (7.4%) (Table 1). Subjects above 16 years (n=260) were more affected than those under 16 years (n=57).

Hansen's disease 15 (1.1%) was the most common bacterial skin infection while Tinea vesicolor 72 (5.4%)

Table 2. Distribution of infectious causes of skin disorders by age and gender.

Skin diseases	Gender		Age (Years)		Total
	M	F	<16	>16	
1. Parasites					
a. Scabies	5	2	7	-	7
b.Onchodermatitis	3	6	2	7	9
2. Fungal					
a. Tinea capitis	6	2	6	2	8
b. Tinea corporis	22	37	6	53	59
c. Tinea ungium	4	12	1	15	16
d.Tinea cruris	1	4	-	5	5
e. Tinea pedis	14	12	6	20	26
f. Tinea manus	3	3	1	5	6
g. Tinea vesicolor	29	43	6	66	72
h. intertrigo	-	1	-	1	1
i. Candidiasis/paronychia	5	9	1	13	14
3. Bacterial					
a. Furunculosis/carbuncles	2	1	1	2	3
b. Impetigo	3	5	4	4	8
c. Periporitis	1	1	1	1	2
d. Hansens disease	6	9	2	13	15
4. Viral					
a. Measles	1	2	2	1	3
b. Molluscum contagiosum	1	8	7	2	9
c. Verrucae	22	15	4	33	37
d. Genital warts	-	4	-	4	4
e. Herpes zoster	6	7	-	13	13

Table 3. Causes of dermatitis by age and gender.

Skin diseases	Gender		Age (Years)		Total
	M	F	<16	>16	
Contact irritant dermatitis	-	2	1	1	2
Contact allergic dermatitis	17	21	5	33	38
Atopic dermatitis	31	49	44	36	80
Pompholyx	3	6	1	8	9
Undetermined type	5	10	1	14	15
Nursing mother dermatitis	-	3	-	3	3
Lichen simplex chronicus	12	18	2	28	30
Hand and foot dermatitis	12	17	5	24	29
Numular dermatitis	-	1	1	-	1

and verruca 37 (2.8%) were the commonest skin disorders due to fungal and viral agents respectively (Table 2).

Atopic dermatitis 80 (60%) was the most frequent dermatitis encountered and commonly seen in children (Table 3). Of the pigmentary disorders vitiligo accounted for 71(72.4%) of the total cases while others were: post inflammatory 23 (23.5%) and melasma 4 (4.1%). Drug eruption was seen in 77 (5.8%) of cases (Table 1). The drugs incriminated were: sulphadoxine-pyrimethamine (n= 52), co-trimoxazole (n=22), carbamazepine (n=2), phenytoin (n= 1).

DISCUSSION

The study shows that infections were the most frequent skin disorders, accounting for 23.8% of the total, and is followed by dermatitis (15.5%) and pigmentary disorders (7.4%). The prevalence of infectious disorders in this study is lower than reports from other African countries (Doe et al., 2001; Adebola, 2004; Altraide et al., 2008; Souissi et al., 2007). A closer analysis of the infectious diseases shows that fungal diseases were predominant in both children and adults and this pattern is comparable with study from other African countries (Doe et al., 2001; Altraide et al., 2008; Tomb and Nassar, 2000; Hartshorne, 2003). The preponderance of infectious diseases may be explained by overcrowding, poor environmental hygiene and the high humidity of the region.

Among parasitic infections, onchocerciasis was the commonest and mainly found in adults in this study. It accounted for 0.7% of all the cases seen and is lower than a prevalence of 35.4% obtained from a community based study (Adeyeba and Adegoke, 2002) in Nigeria. Affected individuals have psycho-social problems as demonstrated by a Nigerian study (Okoye and Onwuliri, 2001). Scabies caused by the mite *Sarcoptes scabiei* variety *hominis* and transmitted by person-to-person contact was very low and mostly seen in children in this study. Low prevalence of scabies in our study may result from the fact that most of such cases are treated in the paediatric out patient clinics by the paediatricians.

Atopic dermatitis was the commonest dermatitis in this study accounting for 80 (6.0%) of patients seen. It was commoner in children (n=44/80) than adults (n=36/80) in this study. Our figure is however lower than a study (Nnoruka, 2001) from south eastern Nigerian which reported a prevalence of 8.5%. Contact allergic dermatitis was the next commonest dermatitis, though not commonly found in children (n=3/38), in our study. Oil exploratory activities in this region may explain the high frequency of allergic contact dermatitis. Shenefelt (1996) reports contact dermatitis as the first (30%) among the types of dermatitis seen in a Mediterranean island of Crete, Greece.

Pigmentary disorders were the third commonest skin disorder and accounted for 7.4% of all cases, among which vitiligo was most frequent. Pigmentary disorders are important because they pose a lot of psychosocial stigma and affects quality of life especially in adults.

Urticaria is a skin disease with significant morbidity and has a wide spectrum of causes. In this study, urticaria affected 6.5% of the subjects, mainly adults and thus will contribute to job time losses with significant reduction in productivity. The patients attending our hospital suffered from either acute urticaria or exacerbations of chronic urticaria.

Drug eruptions accounted for 5.8% of skin disorders in this study and are higher than the figure from other studies within Africa (Doe et al., 2001; Tomb and Nassar, 2000). Drugs commonly incriminated are sulphonamides in anti malarial and antibiotics, anticonvulsant like phenytoin and carbamazepine. This can be explained by high prevalence of over the counter drugs use, outright drug abuses and poor drug use policy in Nigeria.

A wide range of skin conditions may develop as a consequence of HIV infection. In this study pruritic papular eruption of HIV was the commonest skin-related complication of HIV and accounted for 2.3% of skin diseases in our centre. This finding is similar to previous report in Nigeria (Yahya, 2007). It presents with fiercely itchy multiple papules on the face and upper trunk. Recognizing this condition is important, because it is seen only in HIV/AIDS cases and is often mistakenly treated as acne. Kaposi's sarcoma is another skin disorders in HIV infected patients. It accounted for 0.2% of the skin diseases seen in our dermatology clinic. This figure is similar to a previous study recently conducted in our department (Altraide et al., 2008).

Acne is a common skin disorder that affects susceptible pilosebaceous follicles of mainly teenagers and young adults (Onayemi et al., 2005). In this study, acne was found in 4.6% of all cases. It is generally common in females but more severe in males, with clinical evidence indicating a familial trait (Onayemi et al., 2005). Psychologic and emotional stress may accompany this skin condition especially in females (Vahid et al., 2009). Racial and cultural differences may explain the low prevalence (0.2%) of skin malignancies in this study compared to data from Western countries (Vahid et al., 2009). Most of our patients have dark complexions, which provide efficient protection from sunlight.

Conclusion

This review provides useful information about the prevalence of dermatological disorders in patients seeking medical advice at specialized dermatologic clinics and will contribute to proper health care planning and the establishment of essential drug list for dermatological use in Nigeria. Infections especially fungal infections are responsible for most of the skin disorders in Nigeria.

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Full Length Research Paper

Prevalence of depression and role of support groups in its management: A study of adult HIV/AIDS patients attending HIV/AIDS Clinic in a tertiary health facility in Southeastern Nigeria

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The purpose of the study was to determine the prevalence of depression among adult HIV/AIDS patients attending HIV/AIDS clinic in a tertiary health facility in Southeastern Nigeria. The study was a cross-sectional descriptive study carried out in June 2007. A consecutive sampling method was used to recruit participants for assessment of the prevalence of depression among HIV/AIDS patients. A pre-tested questionnaire and Hospital Anxiety and Depression Scale (HADS) were used to collect data. A total of 122 patients were studied and majority of the respondents (86.9%) were between 18 and 40 years with a female preponderance (65.6%). Fifty four percent were married. Almost half of respondents were either traders (27%) or students (22.1%) and majority (80.3%) had a minimum of secondary education. Using HADS, 21.3% were depressed and 21.3% had borderline depression. The main causes of depression were stigmatization and the disease being terminal in nature. Only 53.3% of the total population were aware of HIV support groups, and of this percentage only 46.2% belonged to any support group. Though more of the respondents who do not belong to a support group were more likely to be depressed, the difference was not significant (χ^2 = 1.40, P = 0.236).Depression is very high among HIV/AIDS patients and belonging to support groups may help in its reduction and should be encouraged.

Key words: Prevalence, depression, HIV/AIDS, support groups, Nigeria.

INTRODUCTION

Depression is the most frequently observed psychiatric disorder among HIV/AIDS patients (Rabkin et al., 1994; Ross, 2004). Its specific prevalence is difficult to identify as a result of the wide variations across the globe, ranging from 20 to above 70% (Berger-Greenstein et al., 2007; Sale and Gadanya, 2008; Pence et al., 2007).

Depression has been associated with increased risky behaviours, non compliance to treatment, higher risk for co-morbid disorders and shortened survival (Horberg et al., 2008; Farinpour et al., 2003; Cook et al., 2004). Failure to recognize and treat depression endangers not only the patient but the community as well.

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Depressive tendencies are reduced if the patient's condition is known and accepted by the patient's family and when he involves himself in gratifying activities which could be professional, social or otherwise. On the other hand, risks for depression among HIV/AIDS patients increase when recent affective losses occur (death or rejection of all sorts), an accelerated evolution of opportunistic infections, increasing rate of hospitalizations; its duration as well as physical deterioration.

Furthermore, in patients with HIV disease, severity of depression correlates with rapidity of decline in CD_4 count, suggesting that failure to treat depression may accelerate HIV disease progression and impact on survival (Ross, 2004). In addition, depressed HIV patients treated with antidepressants are more likely to adhere to

antiretroviral treatment than those not (Sambamoorthi et al., 2001).

Recent findings have shown that persons with depressed mood are more likely to engage in high-risk sexual behaviour. (Gore-Felton et al., 2002) This study will assist in identifying depressed patients (requiring antidepressant therapy) as well as the predisposing factors among HIV/AIDS patients attending HIV/AIDS clinic in a Teaching Hospital in Southeast Nigeria.

MATERIALS AND METHOD

A cross-sectional descriptive study was conducted at University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu, Southeast Nigeria. The study population was adult HIV/AIDS patients attending and receiving treatment at HIV/AIDS clinic. Ethical permit for the study was obtained from University of Nigeria Ethics Committee while verbal informed consent was obtained from the participants. The study lasted for 4 consecutive weeks in June 2007. All patients who reported to the HIVAIDS clinic; who gave informed consent and who were not very ill were enrolled in the study.

The study instrument was a semi-structured interviewer-administered questionnaire. Information was sought on their socio-demographic data, knowledge of HIV, belonging to support groups and adherence to medications. Estimation of depression among the patients was done using the Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith, 1983) The HADS is an easily administered 14-item self report measure comprising 7 anxiety items and 7 depression items from which separate anxiety and depression sub-scale scores are calculated. Scoring is as follows:

(i) 0 to 7 = Normal.
(ii) 8 to 10 = Borderline abnormal.
(iii) 11 to 21 = Abnormal.

The data was analyzed using Statistical Packages for Social Sciences (SPSS) version 15.0 and tests of significance were conducted using chi-square. The level of significance was 0.05 while confidence interval was 95%.

RESULTS

The age range of the respondents was 18 to 60 years. This consisted of 34.4% males and 65.6% females (Table 1). Most respondents had completed secondary education while only 6.6% did not complete any formal education. Also most were traders (27%), students (22.1%) or civil servants (22.1%) (Table 1). Many of the respondents (50.8%) identified stigmatization as a major cause of depression among people living with HIV/AIDS (PLWHA) while 42.6% felt it was mainly due to the terminal nature of the disease (Table 2). In addition, only 65 (53.3%) of the total population were aware of HIV support groups, and of this percentage only 30 (46.2%) belonged to any support group.

Using HADS, in all there were 26 (21.3%) respondents who were depressed and an equal number was in borderline state while the remaining 70 (57.4%) were not depressed. A higher percentage of PLWHA who belonged to support group were not depressed (66.7%) compared to those not belonging to any support group (54.3%). The difference nevertheless is not statistically significant (P= 0.236). Most of the respondents belonged to low socioeconomic class, 118 (96.7%). Hence, the impact of social status on rate of depression among PLWHA was not clearly defined by this study (Table 3). Despite this there was still no observed significant difference between social class and the depression status of PLWHA (P = 0.375).

DISCUSSION

Depression is one of the most common psychiatric disorders and its prevalence among PLWHA has been noted to be twice as high as in the general population (Ross, 2004). The most frequently identified cause of depression among this group of patients is rejection of all sorts. This was further highlighted by the present study where a high percentage of the respondents opined that stigmatization were some of the main causes of depression. Indeed, depression may be under reported because patients may be unwilling to discuss their moods with the health workers due to fear of being stigmatized further (Chandra et al., 2005).

In present study, 1 in every 5 patients had depression. This rate is high and similar to previous reports (Ross, 2004; Orlando et al., 2002; Komiti et al., 2003). It is however lower than 36% reported by Pence et al. (2002) and 35% by Bing et al. (2001). On the other hand, it is higher than rate of 14% reported among gay men and non-drug-using women. (Joseph et al., 1990). These variations in prevalence of depression may be due to the various reasons: firstly, it may be due to the diagnostic criteria used by these studies in making diagnosis of depression, example, while present study used HADS some other studies may have used Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV). Secondly, variations may also be due to the various stages of HIV in these patients compared to other studies. Indeed there are conflicting results regarding the influence of stage of HIV infection on depression (Sammod and Bairy, 2007). A study showed poor correlation with severity of apathy and cognitive performance with incidence of depression (Castellon et al., 1998) while in another study there were 40% of seropositive individuals suffering from syndromal depression with suicidal tendency being highest during the first week after the revelation of the seropositive status (Dannenberg et al., 1996). Lastly, depression is known to increase with co-existing medical conditions like HIV/Hepatitis C co-infection (Hauser et al., 2002) and presence or absence of Hepatitis C was not checked in many of these studies.

It is interesting to note that another 21.3% of the respondents had borderline depression. The implication is that appropriate measures should be put in place for the prevention, early detection and management of

Table 1. Demographic variables of patients.

Demographics	Number	Percentage
Age range (in years)		
18-30	57	46.7
31-40	49	40.2
41-50	11	9.0
51-60	5	4.1
Total	122	100.0
Sex distribution		
Male	42	34.4
Female	80	65.6
Total	122	100.0
Educational level		
No formal education	8	6.6
Primary	16	13.1
Secondary	62	50.8
Tertiary	36	29.5
Total	122	100.0
Occupation		
Trader	33	27.0
Student	27	22.1
Civil servant	23	18.9
Farmer	18	14.8
Artisan	14	11.6
Unemployed	4	3.2
Clergy	2	1.6
Teacher	1	0.8
Total	122	100.0
Marital status		
Single	34	27.9
Married	66	54.1
Divorced/Separated/Widowed	22	18.0
Total	122	100.0

Table 2. Patients' opinion on causes of depression.

Cause	Number	Percentage
Stigmatization	62	50.8
Terminal nature of disease	52	42.6
Abandonment by relatives and friends	45	36.9

*Some respondents gave more than one option.

depression, otherwise, many patients will come down with full blown depression in the near future and this will not only result in increased risky behaviours (which will endanger the society at large) but will also increase the co-morbidities associated with HIV/AIDS which will ultimately lead to shortened survival.

Patients' support groups are known to be highly beneficial to patients with chronic diseases as sharing experiences help to improve their ability to cope with their condition (Baker et al., 1996). They also occasionally

Table 3. Prevalence of depression according to support group and social status.

Support group	Depressed {No. (%)}	Borderline {No. (%)}	Not depressed {No. (%)}	Total {No. (%)}
Do not belong to a Support Group	20 (21.8)	22 (23.9)	50 (54.3)	92 (100.0)
Belong to a Support Group	6 (20.0)	4 (13.3)	20 (66.7)	30 (100.0)
Total	26 (21.3)	26 (21.3)	70 (57.4)	122 (100.0)
$\chi^2 = 1.40$, P = 0.236				
Social status				
Low social status	25 (21.2)	26 (22.0)	67 (56.8)	118 (100.0)
High social status	1 (25.0)	0 (0.0)	3 (75.0)	4 (100.0)
Total	26 (21.3)	26 (21.3)	70 (57.4)	122 (100.0)
*Likelihood-ratio $\chi^2 = 1.963$, P = 0.375				

*Some cells have frequency < 5.

offer emotional, informational and material support (Heyer et al., 2010). In present study, only 53.3% of the respondents were aware of HIV support groups and not even up to half of these belong to any support group. This means that over 75% of the respondents are deprived of the benefits derivable from support groups. The reason for this may be from fear of stigmatization.

Although there was no statistical significant difference in the prevalence of depression/borderline depression among respondents who belonged to a support group compared to those who did not (P = 0.236), smaller percentage of those who belonged to support group were depressed (20.0%) compared to those who did not belong to support group (21.8%). This implies that belonging to a support group is perhaps helpful in preventing depression among PLWHA. This has been supported by several other studies (Nguyen et al., 2009; Dageid and Ducket, 2007; Paxton 2002). A similar finding was observed in Cambodia where 23% of members of a PLWHA support group said they had been deterred from suicide, crime and revenge (Kong and Hall, 2000). Even when there is depression, a study by Pfeiffer et al. (2010) showed that peer support interventions help to reduce symptoms of depression.

The effects of social status on the prevalence of depression among these patients were not evident because only 4 (3.3%) respondents belonged to the high social status.

One therefore wonders if HIV/AIDS is mainly a disease of the poor segment of the society or it may be that the richer ones have alternative sources of treatment different from the free services provided by the government institution used for this study.

CONCLUSION AND RECOMMENDATIONS

This study revealed a high rate of depression and borderline depression among PLWHA. It also showed that belonging to a support group may be of assistance in preventing depression, yet only a small percentage belonged to a support group.

It is therefore recommended that routine psychiatric screening of patients should be done at HIV clinics with referrals to appropriate services as necessary. PLWHA should also be advised to belong to a HIV support group. However, to improve the roles of the support groups their sizes should be limited to allow confidentiality and open discussions in the groups. Also, structured curriculum containing up-to-date information about management of depression and anxiety among HIV infected patients should be offered to support groups.

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Full Length Research Paper

Monitoring the influenza pandemic of 2009 in Thailand by a community-based survey

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As an international traveling hub of South-East Asia, Thailand was one of the countries hardest and earliest hit by the influenza A (H1N1) 2009 pandemic. In order to understand the epidemic spread in the country, we conducted community-based surveys in metropolitan, urban, and rural areas using questionnaire interviews. We also determined sero-positive rates from randomly selected samples within the surveyed population. Recalled incidences of fever and acute respiratory symptoms in the survey correlated well with systematic reports of 2009 pandemic influenza cases from hospitals in the same areas, giving a ratio of total cases extrapolated from the surveyed data for persons who sought medical attention reported in the hospital-based surveillance system at 275:1. Conducting a large scale survey of the influenza outbreak is time consuming and also can be difficult to complete in a short time. Therefore, we used the survey for monitoring the outbreak of respiratory disease in the early pandemic phase. The seroprevalence rate was 8 to 10%, with higher rate for younger age groups, and suggests that sufficient herd immunity may have been reached in Thailand, especially in urban areas, while others may still be vulnerable to the second wave of the pandemic.

Key words: Pandemic, influenza, survey, Thailand.

INTRODUCTION

Influenza epidemics can be unpredictable and vary enormously in severity (Bramley et al., 2009). Novel influenza A (H1N1) 2009 was first reported in the USA and Mexico in April 2009 (CDC, 2009). The World Health Organization announced Phase 6 of the influenza pandemic on June 11, 2009. The virus is new to humans, so there are uncertainties about transmission efficiency and disease severity as pandemic influenza continues to evolve rapidly (AlMazroa et al., 2009).

As an international traveling hub of South-East Asia, Thailand was one of the countries hardest and earliest hit by the influenza A (H1N1) 2009 pandemic. The initial cases of laboratory-confirmed influenza A (H1N1) 2009 in Thailand were among travelers and students returning from epidemic area of the American Continent, The Thai Ministry of Public Health (MOPH) reported. In Thailand, locally acquired epidemics of pandemic influenza were first detected in June 2009. In the early epidemic, wide and rapid spreads of influenza transmission primarily occurred in schools in Bangkok metropolitan and major tourist cities (Apisarnthanarak, 2009; Suchada, 2009; Jongcherdchootrakul, 2010).

Having accurate and timely information on the extent of spread of outbreaks is crucial to informed decisions, and to deployment of proper interventions and mitigating measures. Thailand has a well-developed public health infrastructure, however, getting accurate information on numbers of cases and their distribution is often difficult in a widespread outbreak situation (Fraser et al., 2009).

Most public health authorities have relied on systematic reporting of laboratory-confirmed cases, influenza-like illnesses in out-patient settings, hospitalized patients with severe cases, and deaths (Kitler et al., 2002; Rao, 2003;

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Flahault, 2006). Having estimated the total cases based on available data, one has to assume fixed proportions of total cases to the surveyed population, which can be acquired from studies at the beginning of the outbreak when the number of total cases is small enough to be tracked.

In addition, the proportion of patients who seek medical attention can be strongly affected by perception about disease severity, for instance, information gathering through the media, however, this perception can vary with time depending on several factors. The proportion of admitted cases and deaths can also vary as the severity of the virus changes while it evolves. Community-based active survey seems reasonable alternative (Ghosh, 2008; Levy-Bruhl, 2009). However, it is difficult to get accurate data from a large-scale clinical-based survey, because influenza symptoms are mostly non-specific, and other infectious and non-infectious illnesses can confound the findings. To overcome this problem, we designed a community-based survey to monitor the situation of influenza-like illnesses and tested its reliability to detect pandemic influenza infections by serological testing.

METHODS

Questionnaire and survey

The tool we used in the survey was a structured questionnaire, which was tested for feasibility and practicality in a district of the Bangkok Metropolitan Administration (BMA) called Dusit. The set of questions on demographic information of respondents and their families included gender, age, education level, religion, number of household members, and type of property resided in. Also, questions about the trend of the influenza outbreak comprised the number of household members who had influenza-like symptoms in the immediately preceding 2 weeks and in the 3 months prior to the survey; details of influenza-like illness and chronic diseases of each household member; behavior of sick individuals to prevent transmission to others; behavior to prevent oneself from getting influenza; and willingness to receive vaccination. For quality control of the interview process, a group of interviewers were trained, educated, and observed by an investigator as they moved step-by-step to follow the guideline for the survey.

Population and sampling method

The initial outbreaks of influenza A (H1N1) 2009 occurred at Thailand at different times. Areas of the country can be categorized into four groups on the basic of timing of outbreaks as May, June, July and August. We selected the province that first reported an outbreak of pandemic influenza in each of the four time-based groups for our survey including Bangkok Metropolitan Administration, NakhonRatchasima, ChiangMai, and Nakhonsrithammarat, respectively. The household survey by poll method (Poll-1), cluster sampling technique, in urban and suburban areas of BMA was conducted by a poll conducted by experienced interviewers in October 2009. For the other three provinces, their cities were purposively chosen, and rural areas were simply randomized to be surveyed with similar periods and techniques.

We also conducted a serologic survey based on a proportional-cluster sampling technique classified by number of households in sub-districts of ChiangMai and Nakhonsrithammarat. Since the prevalence of Influenza A (H1N1) 2009 in the Thai population was estimated at 20% with 5% as worst acceptable value, a total of 246 respondents should be tested. Face-to-face interviews and blood sample collection was done by an investigator and a team of health professionals. Exclusion criteria for recruitment for blood sample collection was a person who was <5 years old, and when fewer than 75% of family members in the household agreed to provide blood samples.

Case definition

An acute respiratory illness (ARI) case was defined as one affecting a person who had history of at least two of the following symptoms; fever, cough, sore throat, and running noses within recent three months prior to the survey.

Serologic testing

Hemagglutination-inhibition assay (HI assay) was performed as previously described (Iconic et al., 2009). The protocol called for A/Thailand/104/2009(H1N1) live virus as the test antigen; and 0.5% goose erythrocytes were used as the detector. The test sera were rid of non-specific inhibitors by pre-treatment with receptor destroying enzyme (Denka Seiken, Tokyo, Japan), at 37°C overnight, followed by heat inactivation at 56°C for 30 min; nonspecific agglutinator was removed by addition of 50% goose erythrocytes and incubated at 4°C for 1 h. Two-fold serial dilutions of test sera were prepared in duplicate, followed by incubation with the test antigen at a working concentration of 4 HA-units, the highest dilution of antigen that gives complete haemagglutination of cells, for 30 min at room temperature. Erythrocyte suspension was added to the reaction plates, and further incubation at 4°C for 30 min was performed before the result was read. HI antibody titer was defined as the reciprocal of the highest serum dilution that completely inhibited hemagglutination.

A microneutralization assay (MicroNT) was performed as previously described (Kitphati et al., 2009). The assay was based on a reduction in the amount of nucleoprotein produced in the virus-infected Madin-Darby Canine Kidney Cells (MDCK) monolayer as infectivity of the test virus is neutralized by specific antibody. A/Thailand/104/2009 pandemic strain was used as the test virus. The test sera were two-fold serially diluted, added with the test virus at a final concentration of 100TCID50 for 2 h at 37°C. The serum-virus mixture was then added onto the MDCK cell monolayer and further incubated for 24 h at 37°C. The reaction plate was fixed and tested by enzyme-linked immunosorbent assay (ELISA) for presence of the viral nucleoprotein using mouse monoclonal antibody (Chemicon, Temecula, CA) as the primary antibody and goat anti-mouse Igs (Southern Biotech, Birmingham, AL) as the secondary antibody. Antibody titer was defined as reciprocal of the highest serum dilution that could reduce ≥50% of the amount of nucleoprotein when compared with the virus control.

RESULTS

The surveyed incidence of ARI correlated with systematically reported ARI

We initially conducted a small exploratory survey to test tools in a district of Bangkok in August 2009. A total of 90 households were recruited with data for each household member obtained in an interview with a family member

Table 1. Demographic characteristics and practices of prevention measures in community based survey (Poll-1) in 8 areas, Thailand, July - September 2009

Characteristics	Bangkok		ChiangMai		NakornRatchasima		Nakornsrithammarat	
	City	Suburb	City	Rural	City	Rural	City	Rural
Population* (mid-year 2009)	99,994	150,166	238,460	21,405	329,531	83,639	254,261	30,816
Interviewed family (n = 826)	100	115	101	106	103	98	101	102
Family members (n = 3,351)	479	450	352	373	429	434	408	426
- Median of member in family [range]	4 [2-25]	3 [1-20]	3 [1-15]	3 [1-8]	4 [1-10]	4 [1-12]	4 [2-7]	4 [2-8]
Any member developed ARI between July and September 2009 (n = 460) (%)	48 (10)	62 (14)	36 (10)	29(8)	101 (24)	60 (14)	66 (16)	58 (14)
- Male (%)	16 (33)	34 (55)	13 (36)	15 (52)	42 (42)	32 (53)	28 (42)	30 (52)
- Median of age (year) [range]	21 [1-67]	25 [1-55]	24 [2-65]	23 [1-71]	18 [1-76]	7 [1-62]	16 [1-70]	12 [1-52]
Interviewee developed ARI (n = 128) (%)	18 (18.0)	22 (19.1)	14 (13.9)	6 (5.7)	35 (34.0)	6 (6.1)	18 (17.8)	9 (8.8)
- Mask use by interviewee (%)	38.9	63.6	71.4	83.3	31.4	16.7	11.1	22.2
- Mask use by family members (%)	5.6	22.7	0.0	50.0	11.4	33.3	5.6	0.0
- Take a sick leave (%)	33.3	59.1	57.1	50.0	60.0	50.0	83.3	55.6
- Hand covers mouth when cough (%)	77.8	63.6	100.0	83.3	82.9	66.7	94.4	88.9
- Not sharing bedroom (%)	22.2	31.8	21.4	50.0	25.7	0.0	33.3	44.4
- Frequent hand washing (%)	83.3	59.1	92.9	100.0	77.1	50.0	100.0	88.9

* Mid-year 2009 Thai population from Department of Provincial Administration, Ministry of Interior, Thailand.

whose age was higher than 15 years. Report for those households indicated that 62.2% had experienced symptoms of acute respiratory infections, example, fever and/or respiratory tract symptoms during the previous 3-month period. The highest frequency of illness was reported for children and young adults (ages 0 to 19 years).

We subsequently conducted surveys (Poll-1) in two areas each of ChiangMai, Nakhonsrithammarat, Nakhon-ratchasima, and Bangkok Metropolitan Administration (BMA), simultaneously in October 2009. These eight areas represented different levels of impact by pandemic influenza according to the national surveillance system for ARI. A total of 826 families were recruited in the eight survey sites. Among those, a member of each family was randomly selected for interview. Table 1 shows popu-lation density and characteristics of the surveyed areas, as well as demographic data of the surveyed subjects. Of all 460 persons who reported having ARI in the surveyed households, 128 (28%), one from each household, were interviewed for their practice of personal hygiene and their family members' preventive measures, example, a face mask wearing, home rest, personal hygiene practice, bedroom separation, and frequent hand washing (Table 1). The survey showed a cumulative incidence of ARI since the beginning of the epidemic to be just under 14%. Concurrent illnesses of two or more members in the same household were reported in 39% of all reported illnesses. Younger age groups had higher incidence of ARI, with cumulative incidence of ARI up to 43% for children <5 years old (Figure 1). The surveyed ARI incidence was extrapolated to the total population in the eight survey areas. Total numbers of ARI by age group correlate well with numbers of reported pandemic influenza A (H1N1) 2009 by age group in the MOPH system (r^2 = 0.733, $p<0.005$) (Figure 2) giving a ratio of total community-based ARI cases to the reported pandemic H1N1 cases seeking medical attention in the MOPH system was estimated to be 275:1.

We repeated the survey in ChiangMai city and

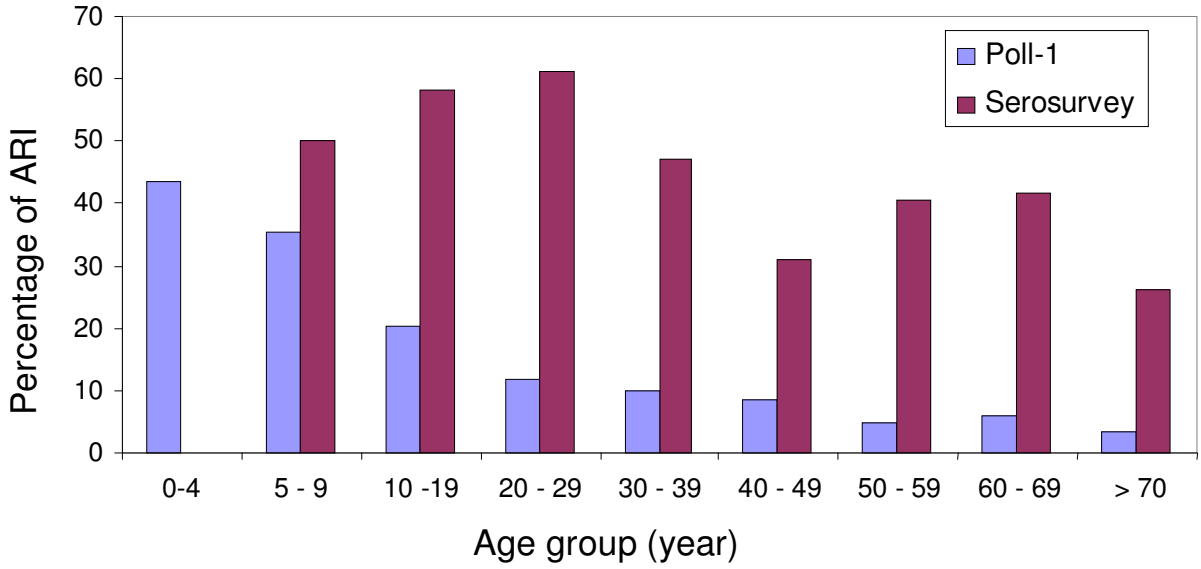

Figure 1. Prevalence of acute respiratory illnesses (ARI) by age-group, community based survey. (Poll-1) in October 2009 (n=3,351) and sero-survey in December 2009 (n=222).

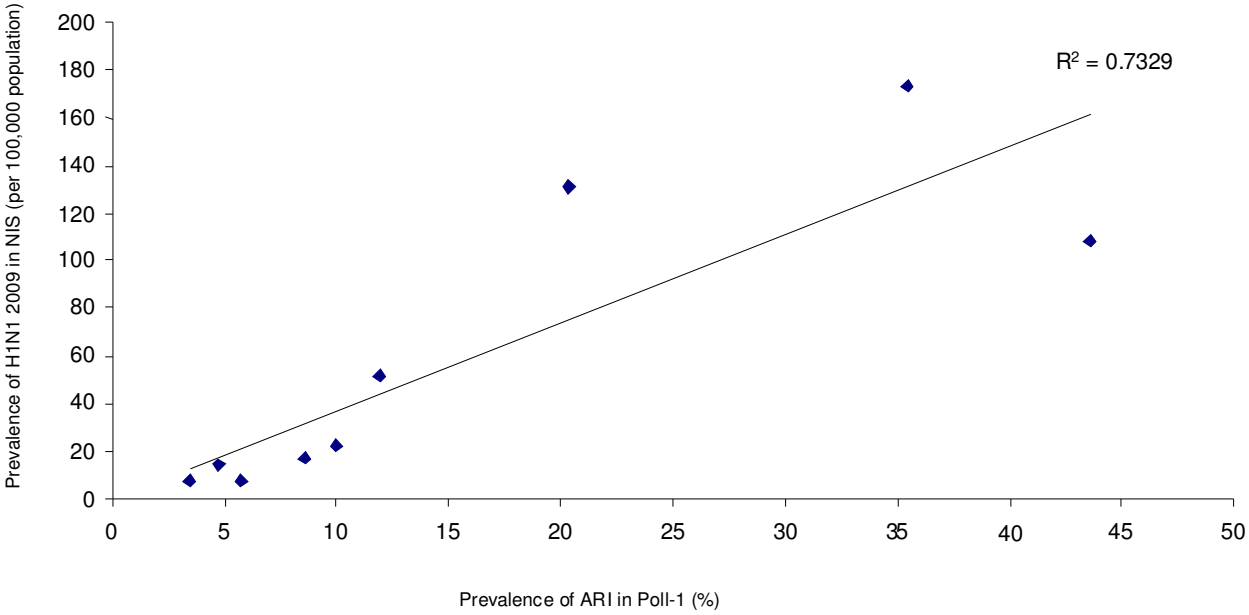

Figure 2. Correlation between prevalence of ARI and prevalence of reported pandemic H1N1 2009 infections by age group in 4 provinces of Thailand, July - September 2009.

Nakhonsrithammarat city in December 2009. The cumulative incidence of ARI increased to 43%, but the incidence of ARI during the 2-week period prior to the survey was 16%.

Antibody detection

In the second survey, we performed serologic tests for antibody to the influenza A (H1N1) 2009 targeted to 246 subjects. Only 222 (90%) subjects from 40 households in ChiangMai city and 44 households in Nakhonsrit-hammarat city had blood samples taken. Among the 222 subjects, a total of 20 serologically positive cases were detected with HI and MicroNT assays, and the proportion of serologically positive subjects was 9% (95%CI: 5.6 to 13.6%). Among the 96 ARI cases, the proportion of serologically positive cases was 14.6% (95%CI: 8.2 to

Table 2. Characteristics of respondents in sero-survey for a novel influenza H1N1, Thailand, December 2009

Factor	All respondents (n=222)	ILI cases (n=49)	ARI cases (n=96)	Seropositive cases (n=20)
Study area				
- ChiangMai city (%)	110 (50)	23 (47)	52 (54)	11 (55)
- Nakornsrithammarat city (%)	112 (50%)	26 (53%)	44 (46%)	9 (45%)
Median of age (years)	45 (range 5 - 89)	35 (range 7 - 70)	39 (range 7 - 89)	12 (range 7 - 57)
Male : Female	0.57 : 1	0.75 : 1	0.58 : 1	0.43 : 1
Education				
- Primary school (%)	86 (39)	17 (35)	32 (33)	12 (60)
- Secondary school (%)	73 (33)	16 (33)	29 (30)	4 (20)
Had history of any chronic illness (%)	85 (38)	16 (33)	40 (42)	4 (20)
Type of house				
- Separated house (%)	154 (69)	32 (65)	64 (67)	13 (65)
- Dormitory / Apartment (%)	64 (29)	17 (35)	32 (33)	7 (35)
Got seasonal influenza vaccine within 6 months (%)	11 (5)	0	3 (3%)	1 (5)

23.3%). Among 126 non-ARI cases, the proportion of serologically positive cases was 4.8% (95%CI: 1.8 to 10.1%).

The demographic findings for all respondents with reported ARI cases, and with sero-positive cases are shown in Table 2. None of the 222 individuals had a history of pneumonia, hospitalization, and Oseltamivir administration. Only 10 (4.5%) individuals had a history of seasonal influenza A vaccination in the previous year, and 162 (73%) of them stated that they would like to get a novel influenza A (H1N1) vaccination. Age-distribution of the sero-positive cases indicates that children and young adults were most affected by the virus. Subjects living in households with more family members had higher of seropositivity rates, indicating the importance of intra-household transmission. Among 20 case families, 11 families had 1 case each, 3 families had 2 cases each, and 1 family had 3 cases. Among the 11 families with 1 case each, the mean attack rate was 30%. Among the other 4 families, the mean attack rate was 58%. The difference in seropositivity rates among the areas is consistent with the survey data (Table 2). Using serologic data as a gold standard, our survey showed that ARI has a sensitivity of 70%, a specificity of 59%, and a positive predictive value of 15%.

DISCUSSIONS AND CONCLUSIONS

In Thailand, the first wave of the 2009 H1N1 influenza pandemic peaked in mid-July, and the low level of transmission activities lasted until October 2009. During late December 2009 to early January 2010, the rising trend in the influenza pandemic signaled an upcoming second wave of the pandemic in Thailand (Figure 3). In all the studied areas, the outbreaks subsided to an insignificant level by the time blood samples were obtained. So the seroprevalence rate reflected the cumulative incidence of the novel H1N1 influenza infections toward the end of the first wave.

It is not clear why the epidemic declined with herd immunity levels of as low as <10%. Behavioral changes caused by increased awareness and public campaigns may have contributed to this pattern (Neumann et al., 2009; Wiwanitkit, 2009). Weather changes, including reduced rainfall, which usually synchronizes with reduction in seasonal influenza outbreaks, may have also played a role. Another possibility is that the H1N1 pandemic may not have been able to sustain itself in the general population but required continuous sources with higher transmission rates and reproduction numbers of greater than one within the subpopulations. With enough herd immunity within these subpopulations, outbreaks might have been interrupted. Our data that show higher sero-positive rates among children support this hypothesis. However, pharmaceutical and non-pharmaceutical preventions and controls were implemented countrywide during the first pandemic wave. The different levels of saturated infection and immunity in different areas may reflect different timing of deployment of interventions, as areas with delayed onset of outbreak could start interventions earlier in the outbreak, or they may reflect different contact rates and transmission rates, thereby required different levels of herd immunity to stop an outbreak.

Our study showed that the rural areas had smaller proportion of ARI cases than cities did. This finding seems to support the pattern of a spread of pandemic influenza from cities to rural area in the early phase of pandemic, and similar patterns have been observed in

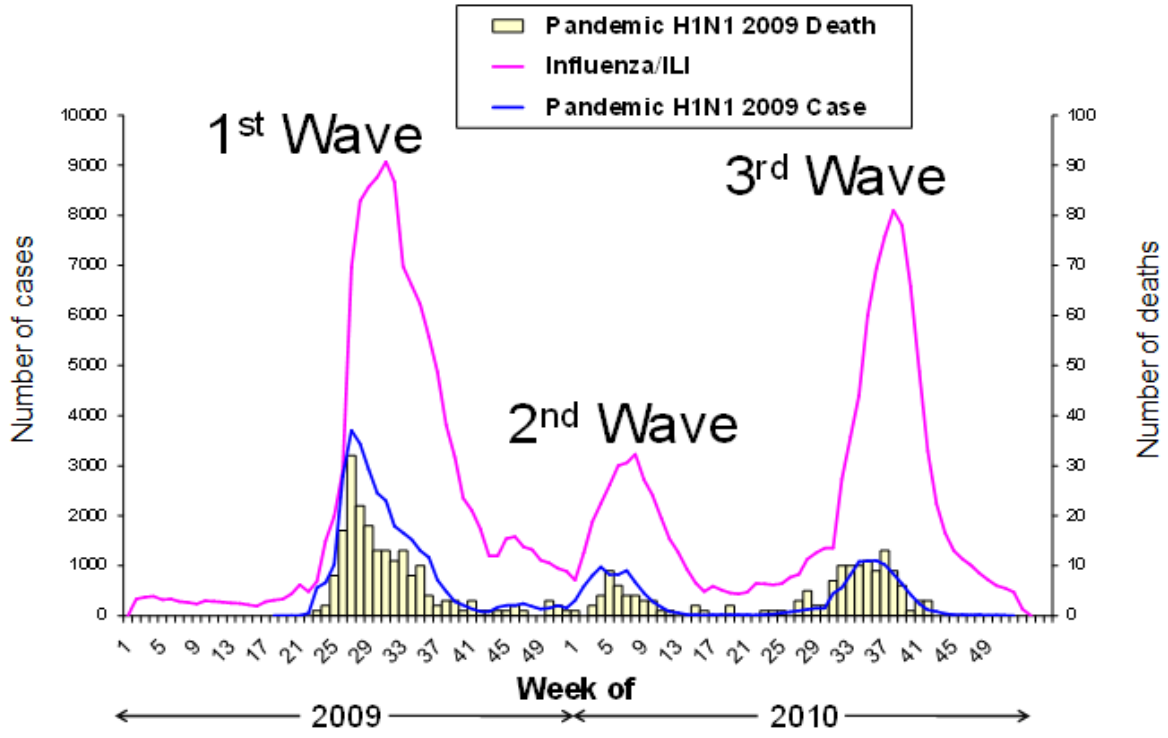

Figure 3. Three waves of the 2009 H1N1 influenza pandemic in Thailand. Source: Bureau of Epidemiology, Ministry of Public Health. Thailand.

many countries (Hien et al., 2009; Lopez-Cervantes et al., 2009; Yasuda and Suzuki, 2009). However, the different perceivable to ARI symptoms between city and rural people and the survey without serologic confirmation in countrywide were not allowed to conclude the spread of pandemic influenza A (H1N1) 2009 from cities to rural area. In addition, we found inadequacy of non-pharmaceutical prevention measures in the families that reported at least one ARI case. Therefore household transmission of influenza virus was inevitable, and sick children served as effective spreaders in families (Appuhamy et al., 2009; Health Protection Agency, 2009).

The limited sensitivity of a questionnaire to detect pandemic influenza infection was likely due to asymptomatic infections or mild infections, which may have been discountenanced. In an outbreak in a military camp in Thailand, in which all subjects were tested for H1N1 pandemic influenza-specific antibody response, we found an asymptomatic infection rate to be just under 30% of all reported infections (Wattanasak, 2010). Nevertheless, survey results are predictive enough to show good correlation with data in official reporting system. This gave a rather constant ratio of extrapolated total cases to reported cases of 275:1. This ratio is very useful for estimation of total cases and of the impact of the outbreak from the existing reporting system all over the country. This information is important for policy makers and for strategic implementation of outbreak control measures.

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Full Length Research Paper

Reasons for incomplete vaccination and factors for missed opportunities among rural Nigerian children

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Mothers play an important role in immunization of their children. A target of 95% immunization coverage is necessary for the sustained control of vaccine preventable diseases. Partial immunization coverage against vaccine preventable diseases is a significant public health problem especially in rural areas in Nigeria. The reasons for partial immunization and factors responsible for missed opportunities are poorly understood and little data is available to explain the phenomenon that could support the decision making. This study aimed at finding out the reasons for partial immunization and factors responsible for missed opportunities for immunization in children less than one year of age. Mothers of children within one year of age were the study subjects using a cross-sectional study design. The immunization card was utilized to check for completeness and correctness of immunization schedule, and also for identifying the appropriate use of all available opportunities for immunization. About two-third (62.8%) of the children were not fully immunized by one year of age, 33.4% had experienced a missed opportunity for immunization and 36.4% were partially and incorrectly immunized. Parents objection, disagreement or concern about immunization safety (38.8%), long distance walking (17.5%) and long waiting time at the health facility (15.2%) are the most common reasons for partial immunization. Missed opportunities for immunization and partial immunization need to be avoided in order to enhance the fully immunized percentage for those children who reach the health facility, especially in rural areas where the immunization coverage is below the expected national coverage (minimum 80%).

INTRODUCTION

Inadequate levels of immunization against childhood diseases remain a significant public health problem in resource-poor areas of Nigeria. The reasons for incomplete vaccination and non-uptake of immunization services are poorly understood. In Nigeria, the EPI targets eight diseases, namely tuberculosis, poliomyelitis, diphtheria, pertusis, tetanus, hepatitis B, yellow fever and measles. Nigeria operates the immunization schedule of the Expanded Programme on Immunization which prescribes five visits to receive one dose of bacille calmette guerin (BCG), four doses of oral polio vaccine, three doses of diphtheria, pertussis and tetanus vaccine, and one dose of measles vaccine (Federal Ministry of Health, 1995). In 2004, the country included hepatitis B and yellow fever vaccines in its schedule, recommending the receipt of three doses of hepatitis B at birth, at six weeks of age, and at 14 weeks of age while yellow fever should be given at nine months of age, along with measles vaccine (World Health Organization, 2005). Previous assessments of full immunization did not include hepatitis B and yellow fever (Adeiga et al., 2005; Onyiriuka, 2005). The standard measure of vaccination coverage is the percentage of children who have received the requisite number of vaccine doses irrespective of the age at receipt of the vaccine (Luman et

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al., 2005). However, to achieve maximal protection against vaccine-preventable diseases, a child should receive all immunizations within recommended intervals (Glauber, 2003).

Receipt of vaccines at recommended ages and intervals ensures that the child is adequately protected from target diseases at all times. A previous study (Ayebo and Charles, 2009) from Nigeria provided some explanations for partial immunization and missed opportunities and these include late reporting for immunization, non-administration of simultaneous injections, longer interval between DPT3 and measles vaccine (three and a half months) compared to that between the other vaccines in the schedule (four weeks). It is also suggested that, as the number of weeks/months postpartum increase, mothers begin to be engaged in other activities such that they may forget and/or may not have time to make scheduled visits for immunizations. The prevention of child mortality through immunization is one of the most cost-effective public interventions in use in resource-poor settings like Nigeria. The expanded program on immunization (EPI) aims at delivering the primary immunization series to at least 90% of infants (Challenges in global immunization and the Global Immunization Vision and Strategy, 2006 to 2015). However, inadequate levels of immunization against childhood diseases remain a significant public health problem in resource-poor areas of the globe (Mayinbe et al., 2005). Nonetheless, the reasons for incomplete vaccination and factors for missed opportunities are poorly understood. Childhood vaccines do much to provide lifetime immunity to certain diseases, but for other diseases, such as pertussis, additional doses of vaccine are now recommended to protect individuals with waning immunity (Centre for Disease Control and Prevention, 2009).

Nigeria like many countries in the African region is making efforts to strengthen its health system in general and routine immunization services in particular to reduce disease burden from vaccine preventable diseases (VPDs). This is against a backdrop of poor routine immunization coverage (12.7% National Average). According to 2003 National Immunization coverage Survey (Nigeria Immunization coverage survey, 2003), immunization coverage by antigen is shown in Figure 1. Routine immunization remains a particular concern for the Government of Nigeria and its development partners including WHO. The Government of Nigeria has put routine immunization high on the agenda and is committed to reverting this negative trend. It is anticipated that this effort will significantly contribute towards achieving the millennium development goal (MDG) of halving child mortality by 2015. A rate of 95% immunization coverage is necessary for the sustained control of vaccine preventable diseases (Glenda et al., 2004). The reported coverage of the basic EPI vaccines particularly DPT3 and OPV3 in the study area (Awe local government area, Nasarawa State, north central Nigeria) in 2008 were 65 and 73% respectively, but these figures include partial and incorrect vaccinations. This may account for sporadic epidemics of vaccine preventable diseases like “poliomyelitis” and “measles” in Awe LGA. Furthermore, it has also been observed that immunezation coverage is not uniform throughout the LGA, with difficult to reach rural areas presenting significantly lower coverage and, thus, contributing to the circulation of “wild polio virus” and “measles”. Parents’ beliefs about immunization risks and benefits may be the most common reason for partial vaccination (Allison et al., 2005). However, there are few data about this reason compared to other reasons such as medical contra indications or access issues (Bond et al., 1998; Hull et al., 2001; Yawn et al., 2001).

Quality of outreach services, cold chain, as well as linking community with health services are among the influencing factors of effectiveness of immunization programs in resource-poor setting like Nigeria. The relative effect of each one of the above factors may significantly vary according to geographical areas (Carr et al., 2000). Knowledge of local impediments to effective immunization programs is very important in the development and implementation of appropriate solutions. This study aimed at finding out the reasons for partial immunization as well as to identify factors that contributed to missed opportunities for vaccination in children less than one year of age in a rural area in north-central geopolitical zone of Nigeria.

METHODS

Setting

This study was carried out in Awe LGA. It has Awe as its headquarter and a development area called Asara. The LGA has a landmass of 2,800 km^2 and is divided into 10 administrative wards (Akiri, Azara, Galadima, Jangaru, Madaki, Makangiji, Kanje Abuni, Ribi, Tunga and Wuse).The total population of the LGA is 138,670 with under five years population of 23,979 while its local economy is based on subsistence farming.

Study design

A cross sectional survey was conducted in 85 villages in all the 10 administrative wards of the LGA between Jan and June, 2008. The completeness and correctness of vaccination schedules were checked using standardised questionnaires. Factors leading to missed opportunities or incompleteness of vaccination were also sought. The child’s vaccination dates, number of doses and dates of visits to the health facility were extracted from the child’s routine immunization card. Information about child immunization history, mother’s knowledge on immunization and the National Program on Immunization and factors affecting compliance with routine immunization schedules was obtained through direct interview (oral interview) from the mothers. The data was collected through locally recruited trained data clerks who were fluent in local language (Hausa). The inclusion criteria are mothers with children between 0 to 11 months of age, residing in the area 18 months prior to the

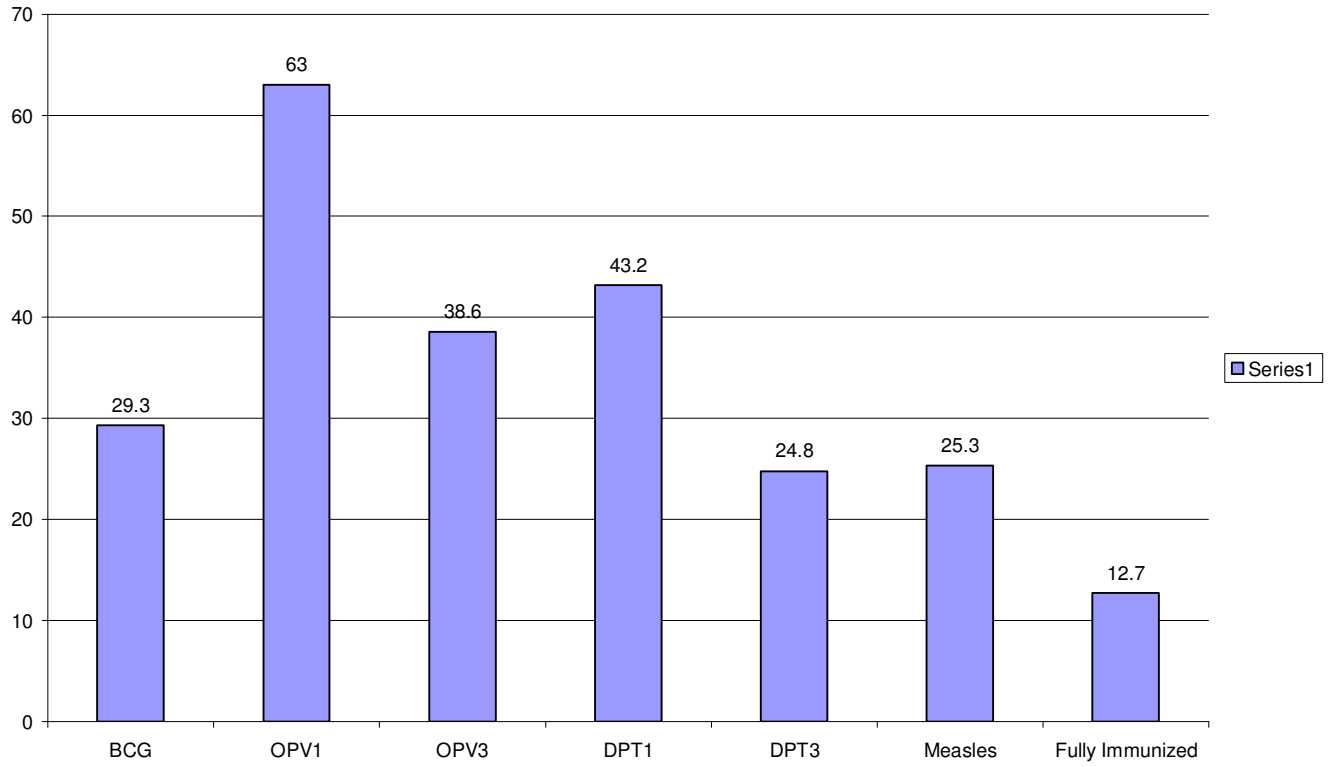

Figure 1. Immunization coverage by Antigen. (Source: Nigeria Immunization Coverage survey, 2003).

study, and also having the child routine immunization card. Mothers were sensitized for the study through the Officer-in-charge of the health facility for routine immunization. The traditional birth attendants, members of the community based organization and market women assisted greatly in mobilization of respondents through information dissemination.

In order to guarantee a high response rate and ensure that mothers were available for the study, information about the study was spread through the locally recruited town announcers. Using the Fisher's formula, a sample size of 685 was obtained. To avoid bias and ensure equal representation of respondents from all the wards, a cluster sampling technique was used to determine the number of respondents from each administrative ward. Households with children under one year of age were selected by simple random sampling.

Data collection and analysis

Scrutinizing Immunization cards and taking careful history, data were collected on Immunization coverage, recent medical visits and recent illnesses. Households and health facilities were mapped to establish geographic contours of probability of immunization. Informed consent was obtained from the mothers through thumb impression/signature after explaining the aims and objectives of the study. All respondents were free to withdraw from the study at any time without any consequence. The data were screened for inconsistencies and missing values. The collected data were entered into computerized data base after coding using an EPI Info version 6.0 package and later converted to SPSS (version 16.0). The correct intervals for immunization were calculated comparing the dates of vaccination with the date of birth. The child was described as being "fully vaccinated" if he/she had a BCG scar and had received all the EPI vaccines within the minimum intervals of time as specified by Nigeria National Program on Immunization, that is DTP/OPV first dose not before six weeks of age with an interval of at least four weeks between doses and measles vaccine not before nine months of age. "Missed opportunity for immunization" is described as situation whereby a child came to a health facility or outreach site, and did not receive the vaccine for which he or she was eligible.

The respondents' verbal information on impression of the distance, time spent to reach the nearest vaccination site and the money spent on transport was used to measure accessibility to a health facility with immunization facilities. Vaccination status and missed opportunities for immunization were calculated by proportion. Differences in proportions were calculated using the Chi-square test with 5% significance level. The ANOVA test was used to compare mean values among subclasses. Associations between factors and missed opportunities or incomplete vaccination status were tested first by the chi-square test. In order to investigate relative importance of the variables in relation to the dependent factors and any confounding between them, they were fitted together in a binary logistic regression model.

Operational definitions

The following operational definitions were used:

Complete immunization

This is a situation whereby the child took all the recommended vaccines including BCG, DPT, Polio, Measles and Hepatitis by the age of one year.

Defaulter

This occurs when the child missed at least one of the recommended vaccine.

Dropout rate

This is the rate difference between the first and the last dose or the rate difference between the initial vaccine and the last vaccine.

Correct vaccination

The child was "correctly vaccinated" if it had a BCG scar and had received all the EPI vaccines within the minimum intervals of time as specified by national policy: DTP/OPV first dose not before six weeks of age with an interval of at least four weeks between doses and measles vaccine not before nine months of age.

Missed opportunity

If a child came to a health facility or outreach site, and did not receive the vaccination for which he or she was eligible, this was considered to be a "missed opportunity" for vaccination.

Accessibility

The accessibility to a health facility with immunization facilities was measured according to mothers' verbal information on impression of the distance, time spent to reach the nearest vaccination site and the money spent on transport.

Migration

Migration history was based on verbal information of prior movement of mothers from one place of dwelling to another over the last two years.

Religion

Religious believer was considered if the mother practiced any religion.

Schooling

Mother's schooling was considered independent of the number of years at school.

Ethical approval

Ethical clearance was obtained from the officer-in-charge of the health facility and Director of the Local Government Primary Health Care Department. Before data collection, written consent was obtained from the respondents.

RESULTS

One thousand, one hundred and fifty four houses were sampled of which 1117 (96.8%) fulfilled the inclusion criteria.

The total children (aged 0 to 11 months) sampled using multistage techniques were 685. The mean age of the children was 11.5 months (range 1 to 22). The sex distributions of the children were 367(53.6%) females and 318 (46.4%) males. Only 19 (2.8%) of the mothers lived in the area less than 6 months and they were excluded from the sample. The study area is very rural with no regular transportation system and the average walking time to the nearest health facility was 100 minutes (ranged from 90 minutes to 215 min). The socio demographic variables of the respondents are shown in Table 1.

Knowledge of mothers on immunization

The main sources of information on immunization were health workers (72.7%), town announcers (10.3%), radio (5.1%), family members (4.9%) and friends (3%). Only 97 (14.1%) knew that the vaccination against childhood killer diseases should be completed at the age of nine months with the yellow fever and measles vaccines. Less than one-fifth (12.8%) of mothers knew that BCG is being given at birth while only 41 (6%) new that Hepatitis B vaccine could also be given at birth and these mothers were the teachers and other educated staff of the LGA. Immunization was mentioned by 138 (20.1%) as a means of prevention against childhood killer diseases. Less than half (37.2%) of the mothers completed routine immunization schedules for their children by the age of 9 months.

Reasons for incomplete vaccination

Various reasons were adduced by the mothers for incomplete vaccination of their children (Table 2). These include long waiting time at the health facility (15.2%), lack of vaccine on the appointment day (3.5%), absence of personnel at the health facility (5.4%), child ill-health at the time of immunization (3.6%), lack of information about the days for vaccination (2.5%), forgetting the days of immunization(1.5%), long distance walking (17.5%), mother's illness on the day of vaccination (0.5%), social engagements (0.4%), lack of money (10.6%), schooling mothers (0.5%), parents objection, disagreement or concern about immunization safety (38.8%) and other miscellaneous reasons (3.5%). Understanding of the importance of vaccination, education and occupational status showed significant differences with respect to children with complete and incomplete vaccination status. Factors such as mothers' age, marital status, schooling level and gender of the child showed no significant differences with respect to vaccination completeness. Similarly, factors such as transportation need, physical accessibility, religious affiliations and knowledge about vaccination contraindication were confounders for

Table 1. Socio-demographic characteristics of respondents.

Variable	Frequency	Percentage	Significance level
Gender			
Female	685	100	
Tribe			
Hausa	663	96.8	0.093
Igbo	17	2.5	
Yoruba	5	0. 7	
Age of respondents (years)			
18 to 29	379	55.3	0.520
30 to 39	241	35.2	
40 to 49	56	8.2	
> or = 50	9	1.3	
Household income/month			
$ 0 to 100	616	90	0.024
$101 to 200	64	9.3	
$>200	5	0.7	
Education			
None	477	69.6	0.076
Primary	158	23.1	
Secondary	33	7.3	
House hold size			
1 to 2	113	16.5	0.732
3 to 4	146	21.3	
>4	426	62.2	

incomplete vaccination status of the children and were found to be statistically non significant (p-value > 0.05).

This study revealed an incorrect vaccination of about 36.4%.

Incorrect immunization in this study consists of less than 3 doses of DPT (10.2%), vaccination with measles antigens after 9 months (12.8%), wrong immunization date (8.3%) and absence of BCG scar (5.1%).

Factors associated with missed opportunities

This study also examined a number of factors associated missed opportunities for vaccination and its associated risk factors. Missed opportunities for vaccination totally constitute 208 (33.4%) children. The mean number of missed opportunities for vaccination per child was 1.68±0.42. More than one-fifth (27.4%) of the children had 2 or 3 times missed opportunities for vaccination and 144 (69.2%) of the children could have completed their vaccination program if they had not missed the opportunity for measles vaccination. Children with missed opportunities for vaccination were more likely to have an incomplete vaccination status than children without missed opportunities P<0.05 (Table 3). Maternal reasons for missed opportunities included sickness (24.5%), social engagement (30.4%), traveling (14.6%), long distance walking (11.5%), and complications from previous injections (19%). Table 3 showed the significant difference between children with and without missed opportunities for vaccination.

DISCUSSION

Determinants of receipt of vaccination completion are complex and interwoven. This study identified several reasons affecting childhood immunization. Parents' objection, disagreement or concern about immunization safety (38.8%), long distance walking (17.5%) and long waiting time at health facilities (15.2%) are the most common reasons for incomplete vaccination-n/immunization. This study showed that parental belief about immunisation safety is the major reason for incomplete immunisations among Nigerian children. Our estimate that 38.8% of parents object, disagree, or are concerned about immunisation is in contrast to a previous case control study from south ethopia (Hemoke et al., 2009) and that of telephone survey conducted in New South Wales (2001) This estimate (38.8%) extrapolates to a large number of children under the age of 5 years in the study area. This could be particularly important in terms of infectious disease outbreaks if concentrated in one geographic area; remembering that 95% immune-

Table 2. Reasons given by mothers of incompletely vaccinated children who disagreed with or were concerned about immunization.

Reasons	Percentage	OR (95% CI)	P to value	OR* (95% CI)	P to value
1. Concern about vaccine safety					
Yes	266(38.8)	2.33 (1.43 to 1.67)	0.015	2.22 (1.63 to 1.86)	0.001
NO	419(61.2)				
2. Long distance trekking/walking					
Yes	120(17.5)	1.88 (0.68 to 0.91)	0.028		
NO	565(82.5				
3. Long waiting time					
Yes	104(15.2)	2.45 (1.15 to 1.43)	0.035	1.74(0.68 to 0.83)	0.002
NO	564 (84.8)	1		1	
4. Lack of money					
Yes	73(10.6)	1.78 (0.64 to 0.87)	0.039		
NO	612(89.4)				
5. Absence of personnel					
Yes	37(5.4)	3.23 (2.46 to 2.88)	0.044	2.33(1.73 to 1910)	0.001
NO	648(94.5)	1		1	
6. Chick sickness					
Yes	25(3.6)	1.82 (0.63 to 0.92)	0.045	2.67(1.55 to 171)	0.001
NO	660(96.4)	1		1	
7. Lack of vaccine					
Yes	24(3.5)	2.39 (1.77 to 1.93)	0.045	2.11(1.89 to 2.23)	0.002
NO	661(96.5)	1		1	
8. Lack of information about day of immunization					
Yes	17(2.5)	1.66 (0.83 to 0.95)	0.045	1.37(0.56 to 0.72)	0.002
NO	668(97.5)	1		1	
9. Forgetting the day of vaccination					
Yes	10(1.5)	3.83 (2.42 to 2.85)	0.041	2.16(1.75 to 1.94)	0 .001
NO	675(98.5)	1		1	
10. Mothers sickness					
Yes	3(0.5)	2.46 (1.23 to 1.67)	0.042	1.53(0.83 to 1.22)	0.003
NO	682(95.5)	1			
11. Mothers level of education					
Yes	3(0.5)	2.46 (1.23 to 1.67)	0.042	2.55(1.77 to 1.89)	0.001
NO	682(95.5)	1		1	
12. Social engagement					
Yes	2(0.4)	2.22 (1.57 to 182)	0.041	2.66(1.51 to 193)	0.002
NO	683(99.6)	1		1	

OR = Odds ratio, OR* = Adjusted odds ratio, % = percentage, *1 = reference variable C. I. = Coefficient interval. Only significantly associated variables ($p<0.05$) are shown in the table.

zation coverage rates must be achieved and maintained to prevent outbreaks (Hull and McIntyre, 2003). A perception of vaccine or immunization safety was a key finding in this study. The Health Belief Model is a theory that attempts to explain health-seeking behavior by examining how people perceive disease severity, their likelihood of contracting that disease, the benefits of taking preventive action, and the costs of taking preventive action (Strecher and Rosenstock, 1997). This theoretical framework is useful in helping to explain these findings.

If parents do not perceive vaccine-preventable diseases as severe enough to warrant preventive action or if they do not perceive any particular benefit to their child's health from vaccination, then they will be more likely to in completing immunization/vaccination doses for their children or oppose any law or policy that mandates such behavior. Of the socio demographic characteristics of the

Table 3. Factors associated with missed opportunity for vaccination in children less than 1 year of age.

Bivariate analysis		Binary logistic		Regression analysis	
Factors	**Percentage**	**OR (95% CI)**	**P-value**	**OR* (95% CI)**	**P-value**
Mother health status					
Sick	168 (24.5)	3.18 (2.32 to 2.67)	(0.025)	2.43 (1.82 to 1.90)	0.012
Healthy	517 (75.5)	1		1	
Social engagements					
Yes	71 (10.4)	2.73(1.45 to183)	0.031	1.78 (1.13 to 1.52)	0.003
No	614 (89.6)	1		1	
Traveling					
Yes	110 (14.6)	3.12 (2.56 to 2.89)	0.002	2.66 (1.75 to 1.87)	0.002
No	575 (85.4)	1		1	
Distance to the health facility					
Long (Far)	79 (11.5)	1.75 (0.78 to 098)	0.024	0.93 (0.89 to 1.25)	0.001
Short(Near)	606 (88.5)	1		1	
Complications from previous injections					
Yes	130 (19)	3.33 (2.55 to 2.72)	0.031	2.14 (1.76 to 1.85)	0.002
No	555 (81)	1	1		
Place of delivery					
Home	548 (80)	1.88 (2.77 to 2.94)	0.022	2.31 (1.79 to 193)	0.004
Health facility	137 (20)	1		1	
Information on NPI					
Yes	141 (21)	1.63 (2.42 to 2.69)	0.031	1.78 (2.65 to 2.88)	0.001
No	544 (79)	1		1	

OR- Odds ratio, OR*- Adjusted odds ratio, %- Percentage,*1 = reference variable, C.I.- coefficient interval, NPI- National Program on Immunization. Only significantly associated variables ($p<0.05$) are shown in the table.

respondents, only monthly family income was found to be predictor of defaulting from completion of child immunization in this study (Table 1). A similar study by Renstein showed that income had consistently affected receipts of immunization (Renstein, 1990). Results of our study also showed that parents who reported lower household income were more likely to have children with incomplete immunization status than parents reporting higher household income. Family income has previously been associated with immunization coverage levels, and low family income is also a risk factor for low immunization (Klevens and Luman, 2001; Bates and Wolinsky, 1998; Zimmerman, 1996). Parents with lower household incomes are more likely to experience

barriers, such as transportation or access to health care services that make staying up-to-date on immunizations difficult (Klevens and Luman, 2001). The low-income parents in this study who had incomplete immunization for their children may have done so because of similar barriers. Other socio-demographic variables were not associated with defaulting. Mothers who had negative attitude about health facility were two times more likely to have defaulter children than mothers who had positive attitude. Similar finding was obtained from other study which showed that the barriers of completion of child immunization were poor knowledge, attitude and perception of health facility support (Coreil et al., 1989). This study had identified that maternal knowledge about immunization was one of the major reasons for defaulting.

Other literatures had similar findings elsewhere (Onyiriuka, 2005; Millman, 1993). Educating parents about vaccine preventable diseases, as well as the vaccines themselves, may be one way to impact the importance of vaccines to the health of their child. This study was conducted in a homogeneous rural community in North Central Nigeria. The majority (92.5%) of the interviewed mothers were from low socio- economic status with low or no formal education. As children were sampled from all the 10 political wards, it is unlikely that our results are biased. One limitation of our study is that the sample is composed primarily of poor women and children from one rural local government area. Because of the relative homogeneity of our sample, we might have probably underestimated the effect of sociodemographic characteristics such as education, income, and source of health care. If the beliefs and attitudes of this group are markedly different from higher socioeconomic and more fully vaccinated groups, then the effects of these beliefs also may be underestimated. Information about vaccine-tion status of children taken from mothers' recall (47.8%) may be another limitation of our study. However, studies

reporting that information about vaccination status of children taken from mothers' recall is accurate are available (Abdelsalam and Sokal, 2004). Our results showed that mothers were not motivated, did not understand the benefits of immunization and were not willing to walk long distances due to fear of constant health worker absence at the health facility. In the study area, the major occupation of mothers is subsistence farming with average monthly income of N1000 (USD 7).

Many of the mothers in the study area spent an average of USD 1.5 per trip to the health facility. Therefore, the direct travelling costs for obtaining all the EPI vaccines are approximately USD 7.5 per child, the equivalent of average monthly income. As the majority of the mothers were peasant farmers with no regular income, the money for the travelling costs came from assistance from family members and significant others. Our findings suggest there is a difference in vaccination coverage relative to the economic conditions of mothers. In rural areas, children in the highest economic quartile have a better immunization coverage rate and a greater probability (2.1 times) of being vaccinated. However, the ability to pay should not be reduced to incentive to immunize. The influence of economic factors remains more complex than ability to pay, as immunization services are offered free of charge in Nigeria. At the same time, it is also difficult to claim that all health centres are providing this free immunization service. Some of the reasons given by mothers for not participating in immunization exercises are that they did not have the money required (suggesting their belief that money is sometimes being demanded from them).

The indirect influence of economic factors on immunization at household levels is a more obvious explanation. When the mother/household is experiencing food and resource shortages, participating in an immunization exercise becomes a matter of lesser priority. A woman who participated in our discussion sessions gave a clear explanation:

“Under the circumstance of food shortage, as parents, you don't want children to wake up and find out that you do not have a solution for their hunger; they will look so depressed and cry. This problem can be one of the reasons for not respecting the appointment with the vaccination team.”

It may be difficult for health planners and decision makers to control the indirect influence of economic factors on immunization uptake. However, there remains a need to identify all the interactions between the health system and the poor communities. Thus, a large-scale communication about the free immunization services and careful monitoring of vaccination procedures should be undertaken to assist the poor communities. The results of this study also showed that the risk of incomplete vaccination status was high in Asara ward. The reasons for this are probably linked with difficult access (bad terrain) to the health facilities, scattered settlements and high cost of transportation. Accessibility as a function of distance and need for using transport were identified as confounder variables for incomplete vaccination. Long distance trekking involving approximately one and half hours (90 min) to reach the nearest health facility was seen as a strong non-motivating factor with a negative influence in completing vaccination schedules. A client-friendly health facility with a well planned and organized fixed and outreach activities that strongly involve the local community, would help to decrease the mothers’ expenses on transportation and the time spent for obtaining vaccination service. There was no evidence to support that child sex had any impact on vaccine uptake or in defining missed opportunities for vaccination in our study area.

In some societies with cultural discrimination against female children, boys have a greater chance to be vaccinated (Akesode, 1982). Marital status and age of the mothers were not seen to be associated with the use of immunization services. In other settings, both younger (Glenda et al., 2004) and older age of mothers (Akesode, 1982) has been reported to be associated with incomplete vaccination. Previous studies (Markland and Durand, 1976; Marks et al., 1979) revealed that educational status of mothers has a strong association with a high vaccine uptake. This study also confirms this assertion from previous studies (Markland and Durand, 1976; Marks et al., 1979). There is an association between education status of mothers and missed opportunities for vaccination. More than two-thirds (70.4%) of mothers with missed opportunities for vaccination had either primary school education or no formal education. This finding is in support of a report from Turkey study (Altinkaynak et al., 2004) that education of mothers increases the vaccination chance of a child and reduces missed opportunity. In our study, 33.4% of the children under one year of age have not completed their vaccination program because of missed opportunities. Factors identified for missed opportunities in these children are long trekking distance with bad terrain (27%), high cost of transportation (33%), poor staff attitude (11%), quality of health services provided (9%), lack of personnel (15%) and vaccine out of stock (5%).

Previous studies have identified missed opportunities for vaccination and inappropriate use of contra indications as important factors inhibiting better EPI coverage (Cutts et al., 1990). Findings from seventy-nine missed opportunity studies (Brown et al., 1982) also showed that the quality of health services was an important cause of missed opportunities for vaccination. The high percentage of children without the BCG scar and vaccinated after nine months of age against measles is worrisome. Frequent posting of health care providers (due to political reason), high cost of transportation, irregular fixed and outreach sessions due to staff attitude,

delivery and living outside the study area, were the factors that showed a stronger association with lower vaccination uptake. The high percentage of number of missed opportunities for vaccination in our study area indicates that immunization coverage would have improved if factors like poor staff attitude (11%), quality of health services provided (9%), lack of personnel (15%) and vaccine out of stock (5%) were prevented. Different strategies are needed to address the varying reasons for incomplete immunization and will be particularly centered on health workers. Although addressing parents' concerns about vaccine safety (guided by currently available resources) (National Health and Medical Research Council, 2003; Hall et al., 2001) will help parents make informed decisions, some parents view this type of education negatively (Sporton, 2001; Leask et al., 2000). Some parents, especially the tertiary educated, may be influenced by alternative methods of presenting information about immunisation risks and benefits such as decision aids (O'Connor et al., 2003) and internet-based resources. Health workers should address parents' concerns regarding the few appropriate side effects and medical contraindications to immunisation to help reduce unnecessary missed opportunity and often lengthy postponement due to mild illnesses (Burgess et al., 1998; Prislin et al., 2002). The concerns and experiences of previously compliant parents concerned after a child experiences minor anticipated vaccine side effects, or a more serious adverse event, should be addressed and managed appropriately (Prislin et al., 2002) including referral to a specialist immunization adverse events clinic if necessary (Wood, 2003; Gold et al., 2003).

Implications of this study for public health practitioners

i) Disagreement or concern, particularly about vaccine safety, is the major parent
reported reason for incomplete immunization. Long distance walking is also common.
ii) Parents who disagree or are concerned about immunization, are significantly more likely to have low educational level and to have children who are completely unimmunized. Children not fully immunized due to illness or access reasons are likely to have started the immunization schedule.
iii) Up to 38.8% of the study parents do not immunize their children because they object, disagree or are concerned about immunization safety. Public health practitioners have an important role in identifying such parents and discussing their concerns with them.

CONCLUSIONS

This study identified the reasons for partial immunization and factors that contributed to missed opportunities for immunization in children less than one year of age in a rural area in Awe LGA, Nasarawa State, Nigeria. Less than half (37.2%) of the mothers completed routine immunization schedules for their children by the age of 9 months. The main reasons attributed by the mothers for partial immunization include, parents objection, disagreeement or concern about immunization safety (38.8%), long distance walking (17.5) and long waiting time at the health facility (15.2%), (Repeated material could be deleted). Factors such as transportation need, physical accessibility, religious affiliations and knowledge about vaccination contraindication were confounders for incomplete vaccination status of the children and were found to be statistically non significant (p-value > 0.05).
Missed opportunities for vaccination totally constitute 208 (33.4%) children. Maternal reasons for missed opportunities included sickness (24.5%), social engagement (30.4%), traveling (14.6%), long distance walking (11.5%), and complications from previous injections (19%). Patronage of health facilities for immunization services in our study area is poor. If the factors contributing to partial immunization and missed opportunities for vaccination could be prevented mothers patronage for vaccination would improve. Mother should also be advised about the importance of vaccination and timely administration of vaccine.

Long distance trekking, poor staff attitude and high cost of transportation are limiting factors for mothers in completing immunization schedules for their children. If special attention is focused on staff attitude, a lot of missed opportunities would be averted and this will have positive impact on immunization coverage. Furthermore, parents' poor patronage for immunization services as a result of long distances and quality of care provided has implications and deserves consideration for routine immunization program.

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UPCOMING CONFERENCES

Third International Conference on Health, Wellness and Society
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