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Full Length Research Paper

Caregivers' perception of the quality of child health care services in a General Hospital in Lagos State

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Nigeria shoulders about 10% of global childhood mortality rates. This poor statistics is related to the poor quality of child healthcare services in the country. This recent study assessed the quality of the different aspects of child healthcare services in an urban General Hospital in Lagos state, Nigeria. Descriptive cross-sectional study was undertaken. Participants were caregivers attending the Child welfare Clinic in a General Hospital in Lagos State. A calculated minimum sample size of 214 caregivers were recruited, and data collected using a pre-tested, interviewer questionnaire at exit point. The mean age of the respondents was 32.3 standard deviation (SD) \pm 6.9 years. The mean waiting time was 112.76 min SD \pm 63.70 min. Majority of the respondents 176 (82.3%) were satisfied with overall quality of services received. Majority of the clients suggested an improvement in staff attitude (29.1%) and reduction in waiting time (28.6%) as ways to improve satisfaction.

Key words: Caregivers' perception, child health care, quality.

INTRODUCTION

Quality of care is one of the major public health concerns in this 21st century. Countries have developed various models of quality assurance. These serve to ensure client satisfaction and overall improvement of their health care delivery services (Adogu et al., 2012). Often, caregivers have little opportunity to express their opinions or to define what they think about the quality of services. Clients' interview accords the opportunity of knowing how well or how badly clients perceived the services offered them through the use of client interview forms (Ajenifuja, 2011). The importance of involving and using consumer perceptions of services is widely recognized in maternal

and child health services in developed nations; and of the best measures of quality of care comes from the patients' perspective. However, this concept has not been fully recognized or accepted in developing countries such as Nigeria (Audo et al., 2005). Nigeria's under-five mortality rates (U5MR) is one of the highest in Africa (157 per 1000 live births) (Ogunnowo et al., 2005). Malaria, low immunization coverage, diarrhea, acute respiratory infections (ARI) and vaccine preventable diseases (VPD) in addition to malnutrition still account for almost ninety percent of these deaths (Bankole and Taiwo, 2013). This alarming rate is not unrelated to the poor quality of child

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Table 1. Socio-demographic characteristics of respondents (N=214).

Variable	Frequency (%)
Age-group	
16-20	10(4.7)
21-30	82(38.3)
31-40	85(39.7)
≥40	37(17.3)
Mean age: 32.3 SD±6.9	
Gender	
Male	29(13.6)
Female	185(86.4)
Marital status	
Single	18(8.4)
Married	196(91.6)
Educational status	
None	30(14)
Primary	54(25.2)
secondary	87(40.7)
post-secondary	43(20.1)

healthcare services in Africa (Campbell, 2007; Ehiri et al., 2005).

Assessment of the quality of child health services by caregivers has shown some causes for concern. Major areas of concern include: inadequacy of staff, materials and equipment, poor attitude and conduct of health workers, long waiting time, technical incompetence, high cost of services, etc (Emmanuel et al., 2013; Juma and Manongi, 2009; Kebashin and Haroon, 2010).

The aim of this study was to assess the caregivers' perception of the quality of the different aspects of child health services provided in a General Hospital in Lagos state.

METHODOLOGY

The Child Welfare Clinic of an urban General Hospital in Lagos State has staff strength of a doctor and 5 nurses. Immunization, health education, treatment of minor ailments and other services are offered to an average of 37 and 150 clients daily and monthly, respectively. This descriptive cross sectional study conducted between 10th to 18th June, 2013, recruited 214 eligible consenting caregivers attending the Child Welfare Clinic based on the calculated minimum sample size, using the Cochran's formula. The 28 question, four sectioned, closed and open-ended interviewer-administered questionnaire sought to answer question on socio-demographic information; perception of caregivers on the adequacy of staff and materials; staff attitude and conduct; perception of waiting time and the overall satisfaction with quality of child health

services. Ethical clearance was obtained from the Research and Ethics Committee of the Lagos University Teaching Hospital. All ethical research protocols were strictly adhered to. Three research assistants were trained for one hour for two days and the study instrument pretested in a similar general hospital among 20 caregivers. Data was entered and analyzed using statistical package for social sciences (SPSS) 18. Categorical variables were presented in tables.

In assessing adequacy of staff and materials, the five-point Likert scale method was used and scores were assigned thus: 1 = very inadequate, 2 = inadequate, 3 = neutral, 4 = adequate, 5 = very adequate. Due to the low number of people in the categories, the five point scale was merged into three level scales, very inadequate and inadequate becoming "inadequate" neutral remaining as it is and adequate and very adequate becoming "adequate" (Ross, 2003). The same modality was also employed in the assessment of the staff attitude and conduct, with the five point scale merged into poor, neutral and good. Assessing the level of caregivers' satisfaction in this study was subjective using the following parameters; very unsatisfied, unsatisfied, neutral, satisfied and very unsatisfied. And this may be a possible limitation to the study.

Ethical approval

Ethical approval was sought and gotten from the Research and Ethics Committee of Lagos University Teaching Hospital (LUTH).

RESULTS

Socio-demographics

This predominantly female 185 (85%), Christian 64.5%, respondents had an age range of 18 to 45 years, with a mean of 32.3 SD ± 6.9 years. Less than half 87 (40.7%) and 99 (46.3%) had secondary education and were traders, respectively. (Table 1).

Perceived adequacy

As regards adequacy, the respondents believed that doctors; nurses; pharmacists; drug quality and vaccine were adequate by 112 (54.3%); 93 (43.8%); 93 (45.6%); 173 (84.4%) and 137 (93.2%), respectively (Table 2).

Staff attitude and conduct

Concerning client-relationship, 163 (80.3%), 137 (68.8%) attested to having good relationship with the doctors and lab technicians, respectively. Initial reception by the doctors, lab technicians and pharmacists were perceived to be good by 165 (81.3%), 136 (68.3%) and 121 (59.4%) of the respondents, respectively. Up to 169 (83.3%) and 138 (69.0%) felt that the doctors and lab technicians treated them with dignity and respect. Concerning willingness to listen, 169 (83.3%), 138 (68.6%) and 152(62.7%) of the respondents rated the doctors, lab technicians and pharmacists good, respectively.

Table 2. Respondents views on different aspects of adequacy in the facility.

Adequacy	Inadequate	Neutral	Adequate	Total
Doctors	66(32.1)	28(13.6)	112(54.3)	206(100)
Nurses	84(39.6)	35(16.5)	93(43.8)	212(100)
Pharmacists	67(32.9)	44(21.6)	93(45.6)	204(100)
Record staff	78(38.3)	34(16.7)	92(45.1)	204(100)
Lab technicians	43(21.6)	37(18.6)	119(59.8)	199(100)
Drugs	13(11.5)	19(9.3)	173(84.4)	205(100)
Vaccine	6(4.1)	4(2.7)	137(93.2)	147(100)
Clean environment	3(1.4)	29(13.6)	182(85.0)	214(100)
Toilet and bathroom	103(53.1)	30(15.5)	61(31.5)	194(100)

Table 3. Respondents views on staff attitude (N=214).

Staff client relationship	Poor	Neutral	Good	Total
Doctors	10(4.9)	30(14.8)	163(80.3)	203(100)
Nurses	57(26.6)	66(30.8)	91(42.6)	214(100)
Pharmacists	32(15.7)	52(25.5)	120(49.9)	204(100)
Record staff	50(24.6)	54(26.6)	99(48.8)	203(100)
Lab technicians	14(7.0)	48(24.1)	137(68.8)	199(100)
Initial reception with the				
Doctors	2(1.0)	30(14.8)	165(81.3)	203(100)
Nurses	28(13.1)	51(23.8)	98(45.8)	214(100)
Pharmacists	11(5.4)	50(24.5)	121(59.4)	204(100)
Record staff	30(14.7)	53(26.0)	102(50)	204(100)
Lab technicians	4(2.0)	47(23.6)	136(68.3)	199(100)
Treating you with respect and dignity				
Doctors	2(1.0)	25(12.3)	169(83.3)	203(100)
Nurses	28(13.1)	52(24.4)	105(49.3)	213(100)
Pharmacists	13(6.4)	50(24.5)	126(61.8)	204(100)
Record staff	31(15.2)	46(22.5)	107(52.4)	204(100)
Lab technicians	5(2.5)	47(23.5)	138(69.0)	209(100)

Mean staff attitude and conduct: 90.5 SD \pm 21.0.

Involvement in health decisions by doctors, lab technicians and pharmacists were perceived by 167 (82.3%), 142 (71.4%) and 130 (63.7%) of the respondents as good (Table 3).

Waiting time and overall satisfaction

The mean waiting time was 112.76 SD \pm 63.70 min, mean consultation time, 9.2 SD \pm 5.6 min and time ranged from 30 to 240 min. Only 47 (23.0%) of the respondents spent less than 60 min, 60 to 89 min [47 (23.%)]; 90 to 119 [14, (6.9%)] and 120 min and above [96 (47.1%)]. Most of the caregivers 27 (12.6%) spent

180 min (Table 4). Over 176 (82.3%) of respondents were satisfied with the overall quality of child health care services (Table 5).

DISCUSSION

Socio-demographic characteristics

The gender distribution revealed a majority of female caregivers with 185 (80%) of them being mothers. This is similar to findings in Nnewi, Nigeria where about 82% of the female caregivers were mothers of the children (Campbell, 2007). Other similar studies had also revealed

Table 4. Perceived Waiting Time at the Clinic (N=204).

Waiting time (min)	Frequency	Percentage (%)
<60	47	23
60-89	47	23
90-119	14	6.9
≥120	96	47.1

Mean waiting time: 112.76 SD ± 63.70 min; mean consultation time: 9.2 SD ± 5.6 min.

Table 5. Respondents views on the level of satisfaction with overall quality of care.

Level of satisfaction with overall child health care	Frequency	Percentage (%)
Unsatisfied	27	12.6
Neutral	11	5.1
Satisfied	176	82.3
Total	214	100

Mean satisfaction: 3.97 SD ± 0.9.

that children are more likely to be brought to the clinic by their mothers (Emmanuel et al., 2013; Ross, 2003). Majority of the respondents were Christians and similar to another study done in Lagos State where nearly 7 out of ten (69%) of the respondents were Christians (Juma and Manongi, 2009). About 87 (40%) of the respondent had secondary education in line with study where 36% of the respondents also had a secondary school education (Campbell, 2007).

Perceived adequacy

In this study 137 (67.7%) of the respondents perceived the staff strength in the health facility to be adequate in tangent with the Tanzanian study where 80% of the respondents gave a favourable response to staff adequacy (Ross, 2003). Up to 84.4% of the respondents felt drugs in the facility were adequate, however, 13 (11.5%) felt that availability of drugs was inadequate, and in consonance with Kenyan study with 17% of the respondents citing unavailability of drugs at the health facilities as a reason for under-utilization of these facilities (Udonwa et al., 2010).

Staff attitude and conduct

The attitude and conduct of the nurses was the most poorly rated. Over 56 (25%) of the respondents rated the nurses' attitude in treating clients with respect and dignity as poor. Above 165 (81.3%) of the respondents felt that the doctors were good at initial reception. This finding

however contrasts the findings of some studies where most of the respondents felt that the care providers were unable to introduce themselves at reception or greet the caregiver (Kebashin and Haroon, 2010; UNICEF/World Health Organization, 2003).

Waiting time and overall satisfaction

The mean waiting time of 112.76 SD ± 63.70 min found in this study was similar to a study in Lagos, LUTH where the waiting time was found to be 92.4 min. Around 156 (73.2%) of the respondents perceived the waiting time to see the health care provider as either long or very long. This is a major inhibiting factor to satisfaction as over 58 (28.6%) of the caregivers suggested that a reduction in waiting time will lead to improvement in the facility. This finding conforms to the findings of some notable studies done in Nigeria (Juma and Manongi, 2009; Uzochukwu et al., 2004). The mean consultation time was 9.2 SD ± 5.6 min. This is similar to a study carried out in South Africa which revealed that the mean duration of a consultation was 8.2 SD ± 4.7 min (UNICEF/World Health Organization, 2003). The commonest problem areas that needed improvement as suggested by the respondents include; staff attitude, waiting time, staff strength etc. However, over 176 (82.3%) of the respondents were satisfied. This level of satisfaction is similar to that of many previous studies (Campbell, 2007; Emmanuel et al., 2013; Juma and Manongi, 2009; Kebashin and Haroon, 2010). The socio-demographic characteristics of the respondents however were not significantly associated with overall level of satisfaction with services received.

Conclusion

Majority of the respondents was satisfied with the services at the facility. However, there is a need to improve the attitude of the staff especially that of the nurses and record staff. Also, the waiting time should be reduced as this is a factor that leads to under-utilization of health care facilities. There is also a need to increase the staff strength, as a limited number of health workers are likely to lead to an increase in waiting time.

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Competing interest

Authors declare no conflict of interest

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Full Length Research Paper

Prevalence and public health significance of bovine cysticercosis at Elfora Abattoir, Bishoftu, Ethiopia

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A cross sectional study was conducted from November 2013 to April 2014 to determine the prevalence of bovine cysticercosis, assess the associated risk factors and public health importance of Taeniasis at Elfora abattoir, Bishoftu town. Active abattoir survey from local zebu cattle presented to Elfora Abattoir and questionnaire survey data collected were analyzed using STATA version 11. From the total 430 carcasses examined, 24 (5.6%) were found to be infected with *Cysticercus bovis*. Cyst prevalence per organs were tongue, 14 (3.2%), triceps muscle 9 (2.1%), masseter muscle 7 (1.6%), heart 4 (0.9%) and diaphragm 1 (0.2%). From a total of 54 *C. bovis* cysts collected, 36 (66.6%) and 18 (33.3%) were live and degenerated cysts, respectively. 64% human *Taeniasis* was recorded with a statistically significant differences ($P < 0.05$) among age groups, gender, raw meat consumption, education level and occupation of individuals interviewed. High raw meat consumers had higher odds of acquiring taeniasis (OR= 48.71) than low raw meat consumers. However, no statistically significant differences ($P > 0.05$) in the prevalence of taeniasis among various religions of the interviewee. The study revealed the presence of bovine cysticercosis and its public health hazards in the area, which needs increasing awareness about the health impact of taeniasis to safeguard the public.

Key words: Abattoir, *Cysticercus bovis*, prevalence, public health, *Taenia saginata*.

INTRODUCTION

Ethiopia has the highest livestock population in Africa with estimated number of 44.3 million cattle, 25.6 million sheep, 23.4 goats, 3.3 million camels and 35.7 million poultry (Community-supported agriculture (CSA), 2004).

Despite the huge population of livestock in the country, efficient utilization of the immense resources is constrained by a multitude of factors in which parasites play a major role. Losses from parasitic infections include

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losses through death, reducing working power, milk yield, hide and skin quality and condemnation carcasses or organs after slaughter (Albero, 1983). One of such parasitic diseases is bovine cysticercosis.

Bovine cysticercosis is parasitic zoonoses, which refers to the infection of cattle with metacestodes of the human tapeworm – *Taenia saginata* (Oladele et al., 2004). *T. saginata* in humans cause bovine cysticercosis, which occurs virtually worldwide, but particularly in Africa, Latin America, Caucasian and south/central Asia and eastern Mediterranean countries. It is found particularly in Mexico, Central and South America, sub-Saharan Africa, India and China (The World Organization for Animal Health (OIE), 2014). It is distributed worldwide, with variable degree of prevalence (Harrison and Sewell, 1991), but most often in developing countries, where unhygienic conditions are coupled with poor cattle management practices and lack or absence of meat inspection (Carlos et al., 2003). Cattle are infected when they swallow *T. saginata* eggs. Ova swallowed by cattle hatch in the duodenum to liberate oncospheres. These enter the lymphatics and blood vessels of the hepatic portal system and spread to muscles via the general circulation. They develop into oval infective cysticerci in 60 to 75 days (Eom et al., 1992).

After consumption by humans with raw or inadequately cooked beef, cysticerci attach to the intestinal mucosa and grow to sexually mature tape worms in about 3 months, gravid (ova containing), actively motile segments detach from the strobilus in the intestines and are passed in the faeces (Gracey et al., 1999). As man is the source of the parasites, human habits are responsible for the spread of bovine cysticercosis. An infected human may pass millions of eggs daily, either free in the faeces or as intact segments, each containing about 250,000 eggs (Urquhart et al., 1996). In areas with transhumant or nomadic systems, these habits are conditioned by the way of life, and animals are exposed to infected faeces. Animals may become coprophagous due to pica, which is linked with certain food deficiencies (CTA, 1989).

In Ethiopia, many parasitic zoonoses like cysticercosis and hydatidosis are commonly reported. Taeniasis due to *T. saginata* is a well known disease in the country. The disease has been reported by different travelers who come to Ethiopia in ancient time and is documented in medical history of Ethiopia (Pankrhost, 1990). Existence of higher population density, raw meat consumption, low awareness, poor hygiene and sanitary infrastructures may facilitate transmission of the disease between cattle and human beings. In some parts of Ethiopia, due to the habit of eating raw beef dishes such as “kurt” and “kitfo” that are served raw or undercooked, the disease has been thought to be acquired from these sources (Teka, 1997).

The prevalence of bovine cysticercosis is different in different agro-climatic zones of Ethiopia (Tembo, 2001)

and the variation of the prevalence ranges from 10 to 70% (Mamo, 1988). Studies to establish the prevalence of bovine cysticercosis and taeniasis in humans have been done in different parts of Ethiopia with various results. For instance, Addis Ababa abattoir 2.2 to 3.2% (Teka, 1997) and 13.3% (Kebede et al., 2009), Bahir Dar 19.4% (Alemu, 1997), Gonder 9.67% (Demissie, 1989), Mekelle 7.23% (Getachew and Ashiwani, 2013), Wolaita Soddo 11.3% (Regassa et al., 2009), Nekemte 21.7% (Ibrahim, 1990) and Debre Zeit 13.85% (Getachew, 1990).

However, there is lack of recent information on bovine cysticercosis and taeniasis in East Shoa Zone of Oromia Regional State particularly in and around Bishoftu. This area is known for its commercial, domestic and export abattoirs growing in number currently. Reliable and up to date epidemiological information is needed on zoonotic parasites such as taeniasis/cysticercosis by veterinary service and public health authorities. Thus, determining prevalence of bovine cysticercosis, human taeniasis and identifying associated risk factors are mandatory. Therefore, the objectives of this study were to determine the prevalence, public health importance and associated risk factors of bovine cysticercosis in Bishoftu town, Ethiopia.

MATERIALS AND METHODS

Study animals

Animals which were presented to Elfora abattoir, Bishoftu, came from different regions in Ethiopia such as Wollo, Gondar and Borana. Local Zebu cattle brought to the abattoir for slaughter were considered a study population for the active abattoir survey. The animals included in the study consist of cattle of different age, sex and origin.

Sampling and sample size determination

Sampling was conducted using simple random sampling method. Accordingly, the sample size was determined using the formula recommended by Thrusfield (2005). A prevalence of 13.8% was recorded by Getachew (1990), nearly 24 years ago; hence in the present study expected prevalence of 50% was taken to increase our sample size.

$$N = 1.96^2 \times P_{exp} (1 - P_{exp}) / d^2$$

Where N = required sample size; P_{exp} = expected prevalence and d^2 = desired absolute precision.

$$N = 1.96^2 \times 0.5 (1 - 0.5) / (0.05)^2 = 384$$

Actually, a total of 430 animals were sampled for this study.

Research ethics

Initially, the research proposal has been subjected to ethical

Table 1. prevalence of *C. bovis* in different organs.

Organs inspected	Number positive	Prevalence (%)
Tongue	14	3.2
Triceps	9	2.1
Masseter muscle	7	1.6
Heart	4	0.9
Diaphragm	1	0.2

evaluation and approved by Mekelle University, College of Veterinary Medicine, Research and Community Services Council. Each participant has been informed about the purposes of the study and their volunteerism to participate was confirmed by taking consent from each respondents. Respondents were free to withdraw from the study and interviewees' data remained confidential throughout the study.

Active abattoir survey

A cross sectional study was conducted on randomly selected cattle slaughtered at Elfora abattoir. Individual identification was given for each cattle to be slaughtered. All cattle were subjected to ante-mortem examination followed by routine post mortem meat inspection procedures. A total of 430 local zebu cattle carcasses presented to Elfora abattoir 5 days/week were examined for the presence of *C. bovis* according to the guideline described by the Ministry Of Agriculture (MOA, 1972). The MOA guidelines followed was as follows; for masseter muscle the deep linear incisions were made parallel to the mandible; the tongue was examined from base to top, the heart were incised from base to apex to open the pericardium and incision was also made into cardiac muscle for detail examination. Deep, adjacent and parallel incisions were made above the point of elbow in the shoulder muscles.

Cyst viability test

The *C. bovis* which was found during meat inspection was trimmed off with the surrounding tissues and transported to Addis Ababa University, College of Veterinary Medicine and Agriculture, Veterinary Parasitology Laboratory for confirmation of cyst viability. The viability of the cysts was examined by using 30% ox bile solution diluted in normal saline and incubated at 37°C for 1 to 2 h. A cyst was regarded as viable if the scolex evaginated according to Gracey et al. (2009).

Questionnaire survey on human taeniasis

To determine the infection rate and associated risk factors of human taeniasis, 100 volunteer respondents from different sex, age, level of education, occupation and religion were selected using random sampling based on willingness to participate in the questionnaire survey.

Data management and analysis

The data collected was entered into Microsoft Office Excel 2007 program and analyzed using STATA software version 11.0 (Stata

Corp, 2009). Descriptive statistic (Chi-squared test) was employed to measure associations among categorical variables. Logistic regression was used to determine the level of significance of risk factors associated with the exposure of human taeniasis. A level of significance of $P \leq 0.05$ was used.

RESULTS AND DISCUSSION

Active abattoir survey

In this study, a total of 430 bovine carcasses were inspected, 24 were found with cyst of *C. bovis* with an overall prevalence of 5.6%. The results of the current study was in agreement with the findings reported in different agro-climatic climatic zones of Ethiopia by Alula (2010) 5.4% in Kombolcha; Dawit (2004) 4.9% in Gonder; Taresa et al. (2011) 3.65% in Jimma and Ibrahim and Zerihun (2012) 3.6% in Addis Ababa abattoir. However, our finding was lower than the prevalence reported by previous authors in different parts of Ethiopia such as Regassa et al. (2009); Kebede et al. (2009); Abunna et al. (2008) and Hailu (2005). The current prevalence recorded was also significantly lower than the report of Getachew (1990) in Bishoftu. Such lower prevalence could be attributed to the change in culture of raw meat consumption, awareness in using latrine and low contamination from where animals were bought.

Anatomical distribution of the cyst

During inspection, *C. bovis* was found in different organs with higher number of cysts encountered in the tongue (14; 3.2%), followed by triceps muscle (9; 2.1%), masseter muscle (7; 1.6%), heart (4; 0.9%) and diaphragm (1; 0.2%) (Table 1). Other studies carried out elsewhere showed that tongue; heart and masseter appear were the most frequent locations for cysticerci (Belino, 1975). Further, Abunna (2006) and Getachew (1990) reported triceps as being frequently affected by the cyst. However, the current study showed that the most frequently affected organ with the highest number of cysts was the tongue which is in agreement with the report of Bedu et al. (2011) and Belino (1975). It is evident from the result that other organs such as triceps, masseter muscle, heart and diaphragm were also frequently affected predilection sites for *C. bovis* which is similar to earlier reports in various endemic areas (Hailu, 2005; Dawit et al., 2012). In this study the diaphragm was ranked among the least affected sites which is in agreement with other reports (Dawit et al., 2012; Abunna et al., 2007).

Cyst viability test

The analysis for viability test showed that (36; 66.6%) of

Table 2. Proportion of viable cyst in different organs inspected.

Organ	<i>Cysticercus bovis</i>		
	No. of cysts examined	No. of viable cysts	Proportion of viable cyst in each organ (%)
Triceps muscle	15	12	80
Tongue	22	16	72.72
Masseter muscle	11	5	45.45
Heart	5	2	40
Diaphragm	1	1	100
Total	54	36	66.6

Table 3. Chi-square analysis of associated risk factors of human taeniasis.

Predictor variables	<i>Taenia</i> Infection (%)		P-value
	Not infected	Infected	
Age of respondent			
15-30 years	21 (67.74)	10 (32.26)	0.00
Above 30 years	15 (21.74)	54 (78.26)	
Gender of respondents			
Male	17 (26.56)	47 (73.44)	0.009
Female	19 (52)	17 (47.22)	
Occupation			
Student	20 (74.07)	7 (25.93)	0.00
Merchant	2 (11.11)	16 (86.89)	
Government-employee	5 (35.71)	9 (64.29)	
Privet employee	5 (45.45)	6 (54.55)	
Daily labor	4 (13.33)	26 (86.67)	
Religion			
Christian	34 (37.78)	56 (62.22)	0.267
Muslim	2 (20.00)	8 (80.00)	
Level of education			
Illiterate	1 (12.50)	7 (87.50)	0.00
Elementary School	3 (12.00)	22 (88.00)	
High school and above	32 (47.76)	35 (52.24)	
Raw meat consumption			
Only raw beef	0 (0.00)	6 (100.00)	0.00
Raw and Partially cooked	14 (20.00)	56 (80.00)	
Only partially cooked	2 (50.00)	2 (50.00)	
Only properly cooked	20 (100.00)	0 (0.00)	

the 54 cysts collected were alive (Table 2). Triceps muscle had the highest proportion of viable cysts (12; 80%) followed by tongue (16; 72.72%), masseter muscle (5; 45.45%) and heart (2; 40%). Only one cyst was

detected in diaphragm, which was viable. The results of viability test showing highest proportion of viable cysts in triceps muscles was comparable to the works of Tembo (2001) and Shimeles (2004).

Table 4. logistic regression analysis of risk factors associated with human taeniasis.

Risk Factors	Exposure (%)	SE	Odds ratio (OR)	95% CI	P-value
Gender					
Female	17 (47.22)	-	-	-	-
Male	47 (73.44)	1.35	3.08	[1.31 -7.28]	0.01
Age					
15-30 years	10 (32.26)	-	-	-	-
>30 years	54 (78.26)	3.64	7.56	[2.93-19.4]	0.00
Raw meat consumption					
No	2 (8.3)	38.75	-	-	-
Yes	62 (81.6)	38.75	48.71	[10.24-231.6]	0.00
Level of education					
Illiterate	7 (87.5)	-	-	-	-
Elementary school	22 (88)	7.01	6.4	[0.74-54.91]	0.009
Above high school	35 (52.2)	-	6.70	[1.83-24.55]	0.004
Occupation					
Gov. Employee	9 (64.3)	3.65	5.14	[1.27-20.67]	0.021
Merchants	16 (88.9)	19.86	22.85	[4.16-125.54]	0.00
Private Company	6 (54.5)	2.56	3.42	[0.79-14.85]	0.100
Daily Laborers	26 (86.7)	12.88	18.57	[4.67-72.34]	0.00

Questionnaire survey on taeniasis

Information collected to determine the status of human taeniasis showed an overall infection rate of 64% (Table 3). The present prevalence recorded agreed with the finding of Dawit et al., (2012) and Abunna et al. (2007) who reported an overall infection prevalence of 62.5 and 64.2% in Wolaita Soddo and Hawassa town, respectively. But the infection prevalence in the current finding was relatively lower than the finding of Hailu (2005) and Dawit (2004) who reported 79.5% in East Shoa and 69.2% in Gondar, respectively. The chi-squared analysis of risk factors associated with the occurrence of human taeniasis revealed a significant difference ($P < 0.05$) for the age group, gender, occupation, level of education and raw meat consumption habit of respondents (Table 3). Regarding age of respondents infected, higher prevalence of infection was recorded in individuals who are older than 30 years compared to those who are younger than 30 years (15 to 30 years). This could be explained by the fact that older people frequently eat raw meat and are prone to infection with *C. bovis*. However, younger people do not have such an access.

Higher prevalence of taeniasis in males than females in the present study could be due to economic reasons and

cultural practices. In Ethiopia, men do not commonly prepare their dish; rather they often visit restaurants and butcheries. This is in agreement with the observation made by Bedu et al. (2011), who reported male have higher odds (OR = 3.77, CI = 95%) than female individuals. The present study also revealed that raw meat consumers had contracted taeniasis infection more frequently than low (occasional) raw meat consumers; this is in agreement with the finding of Megerssa et al., (2010) who reported high raw meat consumers have higher odds of (OR = 17.2; CI = 172.9) than less raw meat consumers. However, no statistically significant difference ($P > 0.05$) in prevalence was observed between Muslims and Christians which is in consent with the findings of Dawit et al., (2012), Abunna et al. (2007), Hailu (2005) and Tembo (2001). The multivariable logistic regression analysis of the risk factors revealed significant difference ($p < 0.05$) in the prevalence of taeniasis in association with raw meat consumers, sex, age, occupation and level of education (Table 4).

Accordingly, male individuals [OR = 3.08, 95% CI (1.31 to 7.28)], respondents above the age of 30 years [OR = 7.56, 95% CI (2.93 to 19.4)], frequent raw meat consumers [OR = 48.71, 95% CI (10.24 to 231)], individuals studied above high school [OR = 6.7, 95% CI

(1.83 to 24.55)], merchants [OR = 22.85, 95% CI (4.16 to 125.5)], daily laborers [OR = 18, 95% CI (4.67 to 72.34)] had higher odds of acquiring taeniasis than female respondents, individuals aged 15 to 30 years, occasional raw meat consumers, individuals studied elementary school, government employee and private company workers, respectively.

In the present study, both abattoir and the questionnaire survey showed that *T. saginata* was an important parasitic cattle disease and in terms of its public health implications in the study area. Teaching and awareness creation to reduce and ultimately avoid the consumption of raw and undercooked meat consumption, improving animal management system and reducing environmental contamination could reduce infection rate in humans and animals.

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Conflict of interest statement

The authors would like to declare that there have no conflicts of interest regarding this research paper.

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Full Length Research Paper

Incidence of glucose-6-phosphate dehydrogenase deficiency in anaemic patients attending General Hospital Kafanchan, Kaduna State, Nigeria

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Glucose-6-phosphate dehydrogenase (G-6-PD) deficiency is one of the most well known human genetic defects and could possibly result in acute haemolysis after exposure to various oxidative conditions. This work was therefore carried out to determine the incidence of G-6-PD deficiency in anaemic patients attending General Hospital Kafanchan, Kaduna State, Nigeria. The study group comprised of 50 sickle cell, 60 iron deficient and 40 malaria patients, while 50 apparently healthy individuals served as control. Statistical analyses of the results according to age group, sex, marital status, packed cell volume (PCV) values, G-6-PD activities and genotype revealed 24 (12%), 26 (13%) and 6 (3%) were G-6-PD deficient in sickle cell, iron deficiency anaemia and apparently healthy, respectively. G-6-PD deficiency was absent in all malaria patients screened. In terms of marital status, singles of both males and females recorded higher deficiency than their married counterpart ($P < 0.05$). Furthermore, the age interval of 0 to 10 years old recorded highest number of G-6-PD deficient subjects in all the anaemic patients ($P < 0.05$). The study therefore suggests the need for routine G-6-PD screening test on anaemic patients to avoid factors which could further precipitate haemolytic crisis.

Key words: Incidence, glucose-6-phosphate dehydrogenase (G-6-PD), anaemia, haemolysis, Kafanchan, Nigeria.

INTRODUCTION

Glucose-6-phosphate dehydrogenase (G6PD) enzyme catalyzes the first step in the pentose phosphate

pathway, leading to production of antioxidants that protect cells against oxidative damage (Luzzatto et al.,

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Table 1. G-6-PD Incidence in the total population screened.

G-6-PD Status	Sickle cell	Iron deficient	Malaria	Apparently healthy
	No. (%) of Subjects	No. (%) of Subjects	No. (%) of Subjects	No. (%) of Subjects
Normal	6 (3)	7 (3.5)	27 (13.5)	33 (16.5)
Reduced	20 (10)	27 (13.5)	13 (6.5)	11 (5.5)
Deficient	24 (12)	26 (13)	0 (0)	6 (3)

2001). G6PD deficiency is the most common enzymatic erythrocyte disorder which is linked to the X-chromosome in humans (Elyassi and Rowshan, 2009; Valaes et al., 1998). A G6PD-deficient patient lacks the ability to protect red blood cells against oxidative stresses produced by the administration of certain drugs, metabolic conditions, infections and ingestion of some foods (Cappellini and Fiorelli, 2008; Glader, 2008).

Deficiency in G-6-PD is believed to affect about 100 million people globally (Carter et al., 2002) and the rate of prevalence is higher among Africans and Asian (Abdulrazzaq et al., 1999). Reports showed that the G6PD A- allele, which contains two mutations, A376G and G202A, is the most common G6PD deficiency variant in Africa (Howes et al., 2013; Johnson et al., 2009) and the severity resulting from G-6-PD deficiency varies significantly between races with more severe deficiency occurring in the Mediterranean population and the milder form in the African population (Owa and Osanyituyi, 1988). Several reports have been published on this genetic disorder in various geographic populations (Beutler, 1993). It has been reported in Greece (Stamatoyannopolous, 1971), Romania (McCurdy et al., 1972), Algeria (Nafa et al., 1994), United State (Geskin et al., 2001), Saudi Arabia (Abdulrazzaq et al., 1999) and Nigeria (Abubakar et al., 2005).

In Nigeria, G6PD deficiency occurs in 24% of boys and 5% of girls (Ademowo and Falusi, 2002). It is also known to be a significant cause of anaemia in children, especially neonates (Sodeinde et al., 1995). Yoruba children had the highest prevalence (16.9%) of G6PD deficiency followed by Igede children (10.5%) and children of Igbo (10.1%) and Tiv (5.0%) ethnicity. Igbo children had 0.38 times the odds of being G6PD deficient compared to Yoruba children. The odds for Igede and Tiv children were not significantly different from Yoruba children (Williams et al., 2013).

Haemolytic anaemia due to G-6-PD deficiency could be severe and life threatening (Luzzatto and Testa, 1978). About 25% of adults throughout the country have the sickle cell trait, AS, while the Hb C trait is largely confined to the Yoruba people of southwestern Nigeria in whom it occurs in about 6%. Other variant hemoglobins including beta thalassaemia are rare, but alpha thalassaemia occurs in 39% (32% with 3 alpha-globin genes; 7% with 2 alpha-globin genes) (Akinyanju, 1989). While screening of patients for G-6-PD deficiency is not a common practice

in health-care delivery services of most poor African countries, there is a need for regular screening of individuals particularly malarial and anaemic patients to be able to establish their G-6-PD status. This is to avoid receiving drugs that could further precipitate haemolytic crisis in G-6-PD deficient individuals.

MATERIALS AND METHODS

Study subjects

This study was carried out on a total of 150 anaemic patients attending general Hospital Kafanchan, Kaduna State, North-Central Nigeria. The patients consist of 50 sickle cell anaemia, 60 Iron deficient anaemia and 40 Malaria patients while 50 apparently healthy individuals served as control. 113 of the subjects were females and 87 were males selected on age ranging from 0 to 75 years old.

Sample collection and analysis

The blood samples (5 ml) from each subject were collected through venepuncture from the antecubital vein of the forearm into dipotassium ethylene diaminetetracetic acid containers. The collected samples were screened immediately for G-6-PD using methaemoglobin reduction test (Brewer et al., 1962), serum ferritin radioimmunoassay test was used in the determination of iron deficiency. Malaria test strips were used to confirm malarial infection in the study group, genotype screening was used to confirm the sickle cell (SS) status of the studied group not under blood transfusion, while packed cell volume (PCV) of all the sampled patients was determined using microhaematocrit reader. The data were subjected to statistical analysis.

RESULTS

The results obtained are presented in Tables 1 to 5. The values are classified on the basis of sex, marital status, PCV values, G-6-PD activity and genotype.

DISCUSSION

The overall incidence of G-6-PD deficiency in the total population sampled has shown that Iron deficiency anaemic patients recorded highest prevalence while no deficiency was recorded among the malaria patients screened. The NADPH, a required co-factor in many biosynthetic reactions, maintains glutathione in its reduced

Table 2. Relationship between G-6-PD deficiency and marital status.

Status	Sickle cell		Iron deficiency		Apparently healthy	
	Total subjects	Deficient subjects (%)	Total subjects	Deficient subjects (%)	Total subjects	Deficient subjects (%)
Married male	5	5(10)	6	5(8.3)	4	1(2)
Single male	20	18(36)	13	11(18.3)	23	4(8)
Female married	4	4(8)	18	18(30)	5	4(8)
Single female	21	13(26)	23	20(33.3)	18	8(16)

Table 3. The relationship between G-6-PD and sex.

Group	Sickle cell		Iron deficiency		Apparently healthy	
	Male n=(25)	Female n=(25)	Male n=(19)	Female n=(41)	Male n=(27)	Female n=(23)
Normal	2(8)	8(32)	3(15.8)	3(7.3)	22(8.1)	11(47.8)
G-6-PD deficient	23(92)	17(68)	16(84.2)	38(92.7)	5(18.5)	12(52.2)
Homozygote	-	7(41.2)	-	14(36.8)	-	4(33.3)
Heterozygote	-	10(58.8)	-	24(63.2)	-	8(66.7)

Table 4. Relationship between G-6-PD deficiency and age of subjects.

Age group (years)	Sickle cell		Iron deficient		Apparently healthy	
	Total subject	Deficient subject	Total subject	Deficient subject	Total subject	Deficient subject
0-10	39	35	28	23	10	-
11-21	2	2	4	4	16	5
22-32	4	4	15	15	15	6
33-43	3	2	16	8	2	1
44-54	2	2	4	4	5	4
≥55	-	-	1	1	2	1

Table 5. Relationship between PCV and G-6-PD deficiency.

Group	Sickle cell		Iron deficiency		Apparently healthy	
	PCV (%)	No. of def. Subjects	No. of def. Subjects	No. of def. Subjects	No. of def. subjects	No. of def. subjects
23-28		29	45		-	
29-34		15	8		-	
35-40		-	-		11	
41-46		-	-		2	
47-53		-	-		4	

reduced form. Reduced glutathione acts as a scavenger for free radicals, and thus helps reduce oxidized haemoglobin to free haemoglobin; otherwise oxidized haemoglobin will precipitate as Heinz bodies. While many other body cells have other mechanisms of generating NADPH, the red blood cells rely completely on G6PD activity because it is the only source of NADPH

that protects the cell against oxidative stress (Obasa et al., 2011).

Iron deficiency anemia is the most common form of anemia. Iron deficiency causes approximately half of all anemia cases worldwide, and affects women more often than men (Stoltzfus, 2001). Iron is a key part of red blood cells. Without iron, the blood cannot transport oxygen

effectively. One means of losing iron is through bleeding. There are various ways of losing iron which include heavy, long, or frequent menstrual periods in women, cancer in the esophagus, stomach, small bowel, or colon, esophageal varices, usually from cirrhosis, the use of aspirin, ibuprofen, or arthritis medicines for a long time, which can cause gastrointestinal bleeding and peptic ulcer disease (Wikipedia). Consequently, the higher incidence of G6PD deficiency was recorded in females with iron deficiency and therefore anaemia will be more severe in women than men.

Although most cases of iron-deficiency anaemia are mild and rarely cause complications, additional effect of G6PD deficiency might trigger severe anaemia, since iron can be converted to radicals which could result to oxidative damage of the erythrocyte's membrane (Beutler, 1994) contributing to abnormal red blood cell breakdown.

Sickle cell anaemic patients recorded the highest prevalence, the sickle cell morphology already predetermines their dysfunctional capacity, with G-6-PD deficiency however, there is an additional stress to this group of patients since the free radical generated either by a parasitic infection or administration of offensive drugs can destroy some of the circulating normal red blood cells.

The absence of G6PD deficiency in malaria patients is not surprising as haemolysis affects mature red blood cells more readily as there are fewer of them to host malaria parasites (Stephen et al., 1986). Moreover, malaria parasites could not thrive in immature red blood cells, thus, when an infected RBC dies before the parasite is ready, the malaria parasite dies as well (Stocker et al., 1985) thereby inhibiting the chances of exerting a disease state and subsequent manifestation of typical symptoms. The study is also in agreement with the *in vitro* work of Capellini and Fiorelli (2008) who reported that malaria parasites grow slowest in G6PD-deficient cells. However, since malaria still sequesters in the liver, affected persons could become very ill from haemolysis and G6PD patients are contraindicated to anti-malaria. The higher prevalence of G6PD-deficiency in subjects of 0 to 10 years is alarming since G6PD deficiency predisposes neonates to neonatal jaundice and sensitivity to certain drugs. Also, untreated neonatal jaundice may lead to hidden risk for Kernicterus (Kaplan and Hammerman, 2004). There is therefore a need to pay special attention to this age group which are selected by the Padiatrics.

The higher incidence recorded in male subjects correlates with the established fact being X-linked, G6PD deficiency allele confers a selective advantage (Allison, 1960) though genetic heterogeneity may result in varying degree of haemolysis across individuals. However, the proportion of female subjects recorded in this study gives room for concern due to possible unfavourable lyonisation, where random inactivation of an X-chromosome in certain cells creates a population of G6PD-deficient red blood cells (Beutler, 1993; 1962; Beutler et al., 1962).

Also G-6-PD is known to generate reduced glutathione (GSH) which are free radical scavengers, however due to the deficiency of G-6-PD, the ability to generate GSH from its oxidized form (GSSG) is lost (Beutler, 1994), thus worsening the anaemia. This observation also correlates with higher number of iron deficient anaemic patients having lowest PCV value as compared to sickle cell anaemic patients.

Conclusion

Incidence of G-6-PD deficiency is higher in the iron deficient and absent in malaria patients. Therefore, there is a need for screening anaemic patients as part of the overall health and welfare service to avoid further complications.

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Conflict of interest

The authors declared no conflict of interest.

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Full Length Research Paper

Clinical benefits to pregnant women on the use of rapid diagnostic test to microscopy in malarial diagnosis in Jigawa State, Nigeria

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The study was aimed at comparing rapid diagnostic test kits (RDTs) and microscopy in detecting sequestered placental malaria or deep tissue malaria from pregnant women and the clinical benefits that can be derived. About 300 pregnant women were enrolled in the study. Five (5) ml of venous and placental blood was collected into an ethylenediaminetetraacetic acid (EDTA) tube, respectively. The blood samples were tested for malaria using microscopy and parascreen (RDTs). The hemoglobin (Hb) concentration was estimated by Hb color scale method. Out of the 300 enrolled, a total of 250 (82.5%) were positive with microscopy while the RDTs detected 300 (100%). Comparing the sensitivity, RDTs had 100% while microscopy had 88.3% and both had 100% specificity. Comparing the age group with frequency of infection, the 21 to 25 years age groups were the most vulnerable with 134 (45.54%). With parity, secundgravidae (1+1) had the highest with 104 (34.32%) and ≥ 4 parity had the least with 50 (16.50%). Those with Hb values ≤ 9 g/dl had the highest incidence with 245 (80.85%), 10 to 11.4 g/dl had 51 (16.86%) while ≥ 11.5 g/dl had the least with 4 (1.32%). About 16.5% were RDTs positive which might have been lost if only microscopy was done.

Key words: Rapid diagnostic tests (RDTs), microscopy, pregnancy, anaemia, parity, sequestration.

INTRODUCTION

Malaria is an infectious disease caused by *Plasmodium species*. They are transmitted from person to person through the bite of an infected female anopheles mosquito (Fernandez, 2006). Malaria generally is a disease of major public health concern in African region, with 562 million people at high risk (World Health Organization (WHO), 2013). It was estimated that there were 166 million clinical cases of malaria in 2012 and up

to 90% malaria deaths of world total was from sub Saharan Africa. 77% of the deaths in the African region was among children < 5 years (WHO, 2013). Each year, 25 to 30 million women become pregnant in malaria-endemic areas of Africa, and similar numbers are exposed to malaria in Asia, Oceania, and South America. Malaria is an important cause of severe anemia in pregnant African women, and by this mechanism malaria

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causes an estimated 10,000 maternal deaths each year. Moreover, malaria infections result in 75,000 to 200,000 low birth weight babies each year, due to combinations of preterm delivery and fetal growth restriction (Guyatt and Snow, 2004). The yearly exposure of at least 50 million pregnancies to malaria infection makes it the most common and recurrent parasitic infection directly affecting placenta (Federal Ministry of Health (FMOH), 2006).

In Africa, perinatal mortality due to malaria is at about 1500/day. In areas where malaria is endemic, 20 to 40% of all babies born may have a low birth weight, hence making malaria in pregnancy one of the priority areas of Roll Back Malaria strategy. It affects more than 3 million pregnant women per year in developing countries, where it commonly causes poor birth outcome and maternal anemia (WHO, 2004). To revert malaria in Africa, there have to be tremendous efforts from all angles to curtail it. Concurrently, there has to be a shift away from the concept of eradication of malaria using indoor house spraying to integrated vector control approaches (WHO, 2006). Efforts to control the disease are as well hampered by the resistance to drugs shown by the *Plasmodia*, to the insecticides by the vectors and the lack of an effective vaccine (Elizabeth et al., 2005).

Malaria in pregnancy is an obstetric, social and medical problem requiring multidisciplinary and multidimensional solution. It is a debilitating, infectious disease characterized by chill, shaking and periodic bouts of intense fever. Pregnant women constitute the main adult risk group for malaria and 80% of deaths due to malaria in Africa occur in pregnant women and children < 5 years (Worts et al., 2006a).

Parasitaemia level and number of peripherally-detected malaria infections, but not the presence of fever, are associated with adverse birth outcomes. Hence, prompt malaria detection and treatment should be offered to pregnant women regardless of symptoms or other preventive measures used during pregnancy, and with increased focus on mothers living in remote areas. The physiological changes of pregnancy and the pathological changes due to malaria has a synergistic effect on the course of each other, thus making the life difficult to the mother and the child (Kakkilayer, 2006; Reyburn et al., 2007). In Africa, malaria in pregnancy is responsible for 400,000 cases of severe maternal anaemia and 200,000 newborn deaths each year. Placental infection, premature birth and low birth weight (a significant factor in infant mortality) are also caused by maternal malaria. In addition, severe maternal anemia increases the risk of perinatal complications.

Plasmodium falciparum causes three specific changes in the placenta. Infected erythrocytes (IE) containing mature trophozoite and schizont parasite stages accumulate in the intervillous spaces (the lake-like structures through which maternal blood circulates), sometimes to high densities. High placental parasitemia

has been associated with preterm delivery (PTD). Placental malaria may be accompanied by intervillous infiltrates of monocytes and macrophages, some containing malaria pigment (hemozoin). High-density monocyte infiltrates are especially common in first pregnancy, and are associated with low birth weight (LBW) and anemia (Brabin et al., 2004; Rogerson et al., 2003).

The problems in the new born include low birth weight, prematurity, intrauterine growth retardation (IUGR), malaria illness and mortality. The pathogenesis of placental malaria is only partially understood, but it is clear that it leads to distinct epidemiological pattern of malaria during pregnancy (Worts et al., 2006b). An integrated understanding of the epidemiological, immunological and pathological processes must be achieved in order to understand how to control malaria in pregnancy. In pregnant women, parasitological and both hematological and biochemical changes should be promptly investigated as part of good clinical practice to improve the differential diagnosis of fever and any possible derangements. This may also reduce the unnecessary prescription and use of anti malaria drugs, many of which are of questionable safety. During pregnancy, *P. falciparum* is sequestered in placenta, often without being detected in the peripheral blood (Moody, 2002).

Rapid diagnostic tests have considerable potential as a tool to improve the diagnosis of malaria. Several commercially available tests are sensitive, specific, and stable under operational conditions. Although microscopy remains the gold standard for diagnosis of malaria, its accuracy under operational condition in Africa is often low. Result of RDTs are rapidly available, less liable to the theoretical risk of being falsely negative due to parasite sequestration, and accessible to both prescriber and patient and can restore confidence in the laboratory (Reyburn et al., 2007). Although RDTs are significantly more costly than the traditional routine microscopy in hospital settings, they are potentially cost effective (Reyburn et al., 2007).

Diagnosis of malaria involves identification of the malaria parasite or its antigens/products in the blood of the patient. Although this seems simple, the efficacy of the diagnosis is subject to many factors. The different forms of the four species; the different stages of erythrocytic schizogony; the endemicity of different species; the population movements; the inter relation between the level of transmission, immunity, parasitemia, and the symptoms; the problem of recurrent malaria, drug resistance, persisting viable or non-viable parasitemia, and sequestration of the parasites in the deeper tissues; and the use of chemoprophylaxis or even presumptive treatment with the basis of clinical diagnosis can all have an impact on the identification and interpretation of malaria parasitemia on a diagnostic test (Bates et al., 2006b). The Jigawa State Ministry of Health in collaboration

Table 1. Baseline characteristics of patients for slides (microscopy) and RDTs.

Characteristic	Microscopy/RDTs
Mean age (years)	30±15
Fever in last 48 h	280
Low hemoglobin level (≤ 9 g/dl)	235
Previous use of antimalarial in current illness	215
Parity stages	4±3
Previously diagnosed positive	300
HIV status	Negative

Table 2. Statistical analysis depicting sensitivity, specificity and predictive values of RDTs and microscopy (n=300).

Methods	Positive S/C	Negative S/C	Sensitivity	Specificity	PPV	NPV
RDTs	300	0	100	100	100	100
Microscopy	250	50	83	100	100	83
P-Value	<0.05	<0.05	<0.05	>0.05	>0.05	<0.05

RDTs = rapid diagnostic tests, PPV = Positive predictive Value, NPV = Negative Predictive Value, S/C = Slide/Cartridge.

with PATHS deployed RDTs to formal health care system of rural areas as part of intensifying the need to avoid missed diagnosis especially to pregnant women and children < 5 years.

MATERIALS AND METHODS

Sample collection

A total of 300 pregnant women were recruited, all attending antenatal clinic at General Hospital, Ringim of Jigawa State. Informed consent was sorted from each participant for the study. At delivery, 5 ml of maternal and placental blood were collected into separate EDTA tubes for thick films, RDTs and hematological assessment.

Making and staining of thick films

Thick films of 2 cm in diameter were made from well mixed blood on a clean grease free microscope slide. The films were stained using Field's stain rapidly (Bates et al., 2006a). All films were later reviewed by the State Malaria Microscopy Quality Control Officer. Parascreen RDT kit was used according to manufacturer's procedures to test for the presence of malarial antigen in the blood samples.

Hemoglobin concentration estimation

Hemoglobin (Hb) color scale technique was used to estimate the Hb concentration of the blood samples in g/dl (Bates et al., 2006a).

Statistics

The results were analyzed using SPSS 15.0 statistical package.

RESULTS

Table 1 shows the baseline characteristics of the participants at commencement of the study, with mean age of 30 ± 15 years. Those with fever within the 48 h were 280, those detected with low haemoglobin level (≤ 9 g/dl) were 235 and those on drugs were 215. Parity ranged between 1 to 4, they were all previously diagnosed malaria positive and non reactive to human immunodeficiency virus (HIV). Table 2 shows the result of sensitivity, specificity and predictive values using both Microscopy and RDTs. Microscopy and RDTs both had 250 vs 300 of positive S/C, Negative S/C of 50 vs 0, Sensitivity 83 vs 100, Specificity 100 vs 100, PPV 100 vs 100, and NPV 83 vs 100, respectively. A significant value ($p < 0.05$) was observed in all but specificity and PPV. Table 3 shows the distribution of malarial infection among the different age groups ranging between 15 to 45 years of age. The age group of 21 to 25 years has the highest infection rate, followed by 15 to 20 age group. From 26 to 30 age group, the infection rate decreases down to 41 to 45 age group in both the diagnostic methods. Table 4 shows the relative malarial infection in association with the number of parity by the mother. Secundigravidae has the highest infection rate followed by those with first time pregnancy. Third with the high rate were those with third time pregnancy while those with the least infection rate were those with four and above parity status. Table 5 shows the hemoglobin distribution among the malaria infected pregnant women. Those with hemoglobin level of 9 g/dl and below have the highest populations followed by those with 10 to 11.4 g/dl while those with hemoglobin 11.5 g/dl and above have the least number of

Table 3. Age groups compared to the rate of malaria infection.

Age groups (years)	Microscopy n (%)		RDTs n (%)	
	Positive	Negative	Positive	Negative
15-20	78 (26.20)	13 (4.29)	91 (30.03)	0 (0)
21-25	104(34.67)	34 (11.33)	138(45.54)	0 (0)
26-30	28 (9.33)	4 (1.33)	32 (10.56)	0 (0)
31-35	24 (7.92)	1 (0.33)	25 (8.25)	0 (0)
36-40	6 (1.98)	4 (1.33)	10 (3.30)	0 (0)
41-45	3 (0.99)	1 (0.33)	4 (1.32)	0 (0)

Table 4. Showing association of parity status and malaria infection.

Parity	Total examined (n)	Microscopy n (%)	RDTs n (%)
		Positive	Positive
1+0	83	72 (24.00)	83 (27.67)
1+1	104	78 (25.74)	104 (34.32)
1+2	63	55 (18.15)	63 (20.79)
≥4	50	45 (14.85)	50 (16.5)

n = sample size, 1+0 = First pregnancy, 1+1 = Second pregnancy, 1+2 = Third pregnancy, ≥4 = Fourth pregnancy and above.

infected population.

DISCUSSION

In Jigawa state, the natural event of pregnancy puts women at greater risk of death at a higher rate than expected. An average of 1500 to 2000 pregnancies out of 100,000 live birth will end in the death of the mother, child or both. In some part of the world in developed countries, the number of pregnancies is fewer than 100 per 100,000 live birth (Department for International Development (DFID), 2006).

The challenges for diagnostic laboratory in Jigawa and most of the African regions which include defective microscope, intermittent power, poor supply of consumables, and time limit to examine slides are well known both to the laboratory managers and to their consumers. To improve these to the standard and comparable sensitivity and specificity of RDTs is not simple or easy to sustain. RDTs if embarked upon will supplement as a tool to offer improvement in accurate and precise diagnosis of malaria in our local setting were competent and other basic requirements are lacking. In most of the request made to the laboratories in syndrome manner, the findings in most cases with respect to malaria parasites request in most cases turnout negative even in severe infections. This may be explained by sequestration of parasites into deep vascular beds. Other possibilities that may affect sensitivity of microscopy in our settings may include work overload, shortage of staff and substandard Romanowsky's stain that flooded our chemical stores

throughout the nation. From the study it was observed that the routine may fail to indicate the presence of malaria parasites as a result of tissue sequestration in the placenta. Therefore, recognizing the increasing importance of accurate diagnosis in an era of negative clinical benefits experiencing by pregnant women, government should be encouraged by experts to place substantial orders for RDTs as guide to treatments of febrile illness (Reyburn et al., 2007).

Prompt detection and treatment with effective anti-malaria should be offered, irrespective of symptoms and use of other preventive measures in pregnancy. While frequent screening was associated with improved birth outcome, reaching mothers living in remote areas to prevent late attendance and low number of visits at antenatal care is essential. What this study has added is that, the parasites in some patient might be sequestered or missed diagnosis in the placenta in about 16.6% (50) cases in the pregnant women attending this comprehensive hospital of the locality. This may contribute significantly in preventing the pregnancy complication due to plasmodiasis among this great population. In Cameroon, 20.1% of pregnant women in a similar study were detected by HRP-2 based RDT and therefore rescued from missed diagnosis using microscopy (WHO, 2004).

CONCLUSION AND RECOMMENDATION

Public enlightenment through the local media radio stations and traditional town criers will ultimately help in

reducing the risk by attending clinic in the early stage of the pregnancy. Public/community sanitation should be enforced so as to clear away the harboring areas that proliferates the mosquitoes. Those attending antenatal clinic should be told on the risk of abandoning their routine drugs in relation to their health and the fetus. They should also be given a free set insecticide treated nets (ITN) as part of the Federal government effort on Roll Back Malaria program. The RDTs test kits should also be supplied free or at well reduced price to the reach of less privileged.

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Conflict of interest

The authors have no conflict of interest

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Full Length Research Paper

Care of patients with liver cirrhosis: How are we doing?

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Cirrhosis carries high morbidity and mortality due to various complications and decompensation, which can be decreased by following various practice guidelines, which are variedly followed in actual practice. This multicentric prospective/retrospective study was conducted over a 3 month period to assess actual care of patients with cirrhosis. 416 patients with cirrhosis (median age 53 years, 316 males) were included in the study. A comprehensive protocol was devised taking into account various practice guidelines. Patients were divided into 3 groups. Group 1: Newly diagnosed patients evaluated as per protocol. Group 2: Patients previously diagnosed at the study centers, past practices assessed. Group 3: patients diagnosed previously at non-study centers, their surveillance practices were assessed. Patients in the 3 groups were similar in terms of age and gender ratio. There was significant difference between varices screening practices amongst 3 groups, however there was similar nonselective beta blockers (NSBB)/endoscopic variceal ligation (EVL) prophylaxis practices. Ultrasound surveillance for ascites varied significantly amongst 3 groups. There was significant difference between antibiotic prophylaxis practice in high risk ascites patients between groups 1 and 2. Evaluation of renal function at baseline and ultrasound surveillance for hepatocellular carcinoma was significantly different in 3 groups. All patients in group 1 underwent SpO₂ monitoring, however none in groups 2 or 3 previously had SpO₂ monitoring. Surveillance and treatment practices for various complications of cirrhosis vary widely in real life and falls well short of goals. Presence of dedicated protocols helps in improving the way we care for our patients with cirrhosis.

Key words: Portal hypertension, varices, ascites, hepatocellular carcinoma (HCC), surveillance

INTRODUCTION

Burden of disease due to liver cirrhosis is increasing worldwide because of increasing alcohol consumption, epidemic of diabetes and obesity and hepatitis C infection (Williams, 2006). Approximate prevalence of clinical cirrhosis is 0.1% and histological cirrhosis 1% in an adult population (Schuppan, 2008). Prevalence of cirrhosis

increases as the age advances (Jansen, 2002). Hence improving life span worldwide will increase the burden of cirrhosis. Liver cirrhosis is defined as development of regenerative nodules surrounded by fibrous septa in response to chronic liver injury (GarciaTsao et al., 2010). This leads to vascular remodeling and giving rise to

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portal hypertension and end stage liver disease (Amarapurkar et al., 2007). Liver transplantation is the only treatment which improves both longevity and quality of life in patients with decompensated liver cirrhosis (O'Brien et al., 2013). However every patient with decompensated liver cirrhosis is not eligible for transplantation, and it is not available for majority of the patients.

Our current understanding of natural history, pathophysiology and treatment of complication has resulted in improved management and life expectancy in patients with decompensated liver cirrhosis (Tsochatzis et al., 2012). Median survival of patients with compensated cirrhosis is 12 years while that of decompensated patients is reduced to 2 years (GarciaTsao et al., 2010). Approximately 5 to 7% of the patients change from compensated stage to decompensated stage every year (D'Amico, 2001). Portal hypertension (PH) is a universal consequence of cirrhosis responsible for most of the complications like esophagogastric varices, variceal bleeding, ascites, spontaneous bacterial peritonitis, hepatorenal syndrome and hepatic encephalopathy (GarciaTsao et al., 2010). PH in cirrhosis is defined by hepatic venous pressure gradient (HVPG) more than 5 mm of mercury. HVPG is an indirect measure of portal pressure. Now it is clear that HVPG more than 10 is a significant PH above which the complications like variceal bleeding and ascites develop (Bosch et al., 2008). Currently, proposed classification of cirrhosis is based on the degree of PH and associated clinical features. Development of ascites, variceal bleeding and hepatic encephalopathy is considered to be decompensated cirrhosis (GarciaTsao et al., 2010). PH results from increase in the intrahepatic resistance which has dynamic and fixed components and it is coupled with increase in the portal blood flow (GarciaTsao et al., 2010). Therapeutic interventions which can reduce the HVPG like non selective beta blockers and transjugular intrahepatic portosystemic shunt (TIPS) can be helpful in combating complications of cirrhosis, and they have been shown to improve survival (Garcia-Tsao et al., 2009; Garcia-Tsao et al., 2007; Garcia-TsaoG and Bosch, 2010). A meta-analysis of many studies has shown non selective beta blockers and endoscopic band ligation as the effective therapies for primary and secondary prophylaxis of variceal bleeding due to portal hypertension which significantly improve the survival in patients with cirrhosis (Mellinger and Volk, 2013).

Angiogenesis in cirrhosis of any etiology leads to the development of hepatocellular carcinoma (HCC) (Bruix and Sherman, 2011). Incidence of HCC is also increasing world-wide due to epidemics of hepatitis C infection and non alcoholic steato-hepatitis (NASH). Surveillance for HCC in high risk population with ultrasound and alpha-feto protein (AFP) has been recommended by various guidelines (Bruix and Sherman, 2011; Asia Pacific Working Party on Prevention of Hepatocellular Carcinoma, 2010; Omata et al., 2010). This strategy has

led to the detection of early HCC and curative treatment for the same. Bacterial infection is common in cirrhosis, especially spontaneous bacterial peritonitis, with one month mortality of 30%. Oral prophylactic antibiotics and bowel decontamination have shown to improve long term outcomes in patients with decompensated cirrhosis (European Association for the Study of the Liver (EASL), 2010; Runyon, 2013).

Therapeutic modalities can reverse the cirrhosis. These modalities according to the etiology are: (1) abstinence for alcoholic cirrhosis, (2) antiviral therapy for hepatitis B, (3) immune-suppression for autoimmune hepatitis, (4) relieving biliary obstruction in patients with secondary biliary cirrhosis, (5) antiviral therapy for hepatitis C, and (6) relieving obstruction in patients with Budd Chiari syndrome. Future therapies like anti fibrotic, anti-angiogenic agents and anti-coagulants may potentially reduce liver fibrosis, thereby reversing cirrhosis (GarciaTsao et al., 2010). Stem cell therapy may be helpful in patients with liver cirrhosis (Amin et al., 2013). Principles of management of patients with liver cirrhosis are: Prevent hepatic injury by identifying the etiology and treating it at the earliest. Identify cirrhosis at the asymptomatic stage, treat complications at the earliest. Avoid iatrogenic injuries and implement appropriate life style modification. Cirrhosis should be considered as a potentially treatable chronic disease. The treatment of cirrhosis should be based on a chronic care model with frequent follow-up. Surveillance practices for complications of cirrhosis have been developed on the basis of large number of randomized control trials. Compliance with the practice guidelines for surveillance has shown to be associated with a significant improvement in survival in patients with variceal bleeding and HCC (Tsochatzis et al., 2012)(Garcia-Tsao et al., 2009; Garcia-Tsao et al., 2007; Garcia-TsaoG and Bosch, 2010; Mellinger and Volk, 2013) (European Association for the Study of the Liver (EASL), 2010; Runyon, 2013; Amarapurkar, 2012).

In spite of this overwhelming evidence, the guidelines in the management of cirrhosis are not followed properly (Mellinger and Volk, 2013). Hence, we planned this prospective/retrospective study to assess how appropriately we are caring for patients with cirrhosis.

MATERIALS AND METHODS

This was a prospective as well as retrospective multicenter observational study to evaluate practices in management of liver cirrhosis. Study was conducted at five tertiary care gastroenterology centers from Western and Central India, of these 5 centers, two centers were academic centers while three were private practice based centers. All patients with liver cirrhosis attending these centers from 1st January, 2013 to 31st March, 2013 were included in the study. Diagnosis of cirrhosis was based on clinical, biochemical, endoscopic, imaging findings as well as histological evidence of cirrhosis. A comprehensive protocol was written, taking into account various practice guidelines. Protocol included baseline evaluation of patients with cirrhosis with complete hemogram, liver and renal biochemistries, coagulation profile including prothrombin

time and International Normalized Ratio (INR), lipid profile, serum electrolytes, an ultrasound with Doppler evaluation, ascites fluid examination for protein, albumin and cell count, an upper gastro intestinal (GI) endoscopy, electrocardiogram (ECG), 2D echo, assessment of oxygen saturation by pulse oximetry and if required, contrast echocardiography, serum iron studies, viral markers pertaining to hepatitis B virus (HBV) and hepatitis C virus (HCV), human immunodeficiency virus (HIV) status, autoimmune markers if clinically pertinent, vitamin D3 levels and alfa-feto protein. A 6-monthly ultrasound evaluation HCC surveillance was incorporated into the protocol.

Patients were divided into three groups and were assessed for the surveillance practices as follows: Group 1: Patients newly diagnosed as cirrhosis during the study period after setting the protocol. Group 2: Patients previously diagnosed by the study centers, the surveillance practices before the study period were assessed. Group 3: patients diagnosed by centers other than the study centers, their surveillance practices were assessed. Patients diagnosed as cirrhosis previously were included only if they attended the study centers during the study period. All patients diagnosed as cirrhosis previously were subjected to clinical history and physical examination. Their previous records were retrospectively assessed by two physicians for etiological workup, assessment of complications, surveillance for HCC and treatment followed. Newly diagnosed patients were also assessed similarly. Records pertaining to referral doctor, diagnosis, investigations and treatment done prior to presentation at one's centre were noted in detail. The clinical history, examination, investigations and treatment done at centre were noted in detail (both outpatient and inpatient). Appropriate evaluation for etiology of cirrhosis included history of alcohol consumption, diabetes, obesity, dyslipidemia and screening for HBV and HVC. Patients without history of alcoholism and without evidence of chronic HBV and HCV were evaluated for autoimmune hepatitis. Work up for Wilson's disease, hemochromatosis, primary biliary cirrhosis (PBC) and primary sclerosing cholangitis (PSC) was done whenever clinically suspected. Patients with cryptogenic cirrhosis were subjected to liver histology if autoimmune liver disease was suspected. In patients previously diagnosed, cirrhosis etiological work up based on the aforementioned factors was classified as adequate or inadequate.

All the patients diagnosed with cirrhosis were advised to undergo upper GI endoscopy; patients with previously diagnosed cirrhosis also were assessed whether they had undergone upper GI endoscopy at the time of diagnosis, irrespective of past history of upper GI bleed. Amongst those with large varices on endoscopy (F2 or F3 grade as per Japanese classification) with or without red wale signs, we assessed the proportion of patients who received non-specific beta blocker or endoscopic variceal ligation as prophylaxis, either primary or secondary. Patients with ascites were subjected to diagnostic ascitic fluid examination including serum ascitic fluid- albumin gradient, cell count. Records of patients previously diagnosed as cirrhosis were checked for ascitic fluid examination reports. Those with ascitic fluid protein < 1 gm/dl were considered to have high risk ascites. We determined antibiotic prophylaxis practices in those with high risk ascites as well as those with a prior history of spontaneous bacterial peritonitis (SBP). We determined the frequency with which alpha-fetoprotein (AFP) was being done in patients at diagnosis in three groups. Since the patients in group 1 were newly diagnosed as cirrhosis, they were excluded from assessment of being in a surveillance ultrasound program. We determined number of patients in groups 2 and 3 who had been diagnosed as cirrhosis for at least 6 months, and who were receiving regular 6-monthly ultrasound surveillance for HCC. Records of all patients of previously diagnosed cirrhosis were checked for testing for minimal hepatic encephalopathy, cardiovascular status and pulmonary status. Results of all these tests were tabulated in a predetermined proforma. The study

protocol was approved by institutional review boards and every patient gave written consent to participate in the study.

Statistical analysis

Numerical data were expressed as median, standard deviation and range (minimum to maximum) and categorical data as counts and percentages. Categorical variables were tested using the chi-square and Fisher's exact test. Continuous variables with and without normal distribution were compared using Student's t-test or the Mann-Whitney U test, respectively. P value < 0.05 was considered significant for all statistics.

RESULTS

A total of 416 patients, either known cirrhotics or newly diagnosed during the study protocol period were included. Median age of the enrolled patients was 53 years (range: 8 to 91 years). 316 patients (75.96%) were males. Patients were divided into three groups as follows: Group 1: 167 patients. Group 2: 200 patients, Group 3: 49 patients. The three groups were similar in terms of median age (53 vs. 54 vs. 52 years, p value 0.447) and proportion of male patients (77.25, 75 and 75.51%, respectively, p value 0.879). Alcohol was the most common etiology of cirrhosis in the three groups, its prevalence varying from 32 to 41%, the difference being statistically non-significant (p value 0.182). NASH/cryptogenic etiology of cirrhosis were second most prevalent etiology, and exceeded HBV as a cause in groups 1 and 2. In group 3, HBV prevalence was slightly higher than NASH/cryptogenic etiology (26% vs. 22%). However this difference in terms of etiology was non-significant across groups (p values 0.078 and 0.291 for HBV and NASH/cryptogenic, respectively). Prevalence of HCV and AIH was under 10% across groups. PBC, PSC, Wilson disease formed the rest. Thus, all the three groups were similar in terms of etiological profiles. Mean MELD scores were similar in 3 groups (p value 0.326), thereby indicating uniform severity of liver disease in the three groups (Table 1).

Screening for varices at baseline and nonselective beta blocker (NSBB)/endoscopic variceal ligation (EVL) prophylaxis

We assessed screening practices among the three groups (Table 2). Amongst patients diagnosed for the first time as cirrhosis at the study centers, after the protocol was set, 91% (152 of 167) patients were screened for varices irrespective of past history of upper GI bleed in form of hematemesis or malena. Amongst these, 54 patients had history of upper GI bleed. Thus, of those 113 patients without past history of upper GI bleed, 98 patients (86.72%) underwent screening for varices at diagnosis. On the other hand, amongst patients previously diagnosed by us as cirrhosis, only 65% (130/200) had

Table 1. Basic demographic profile and etiological profile of patients in the three groups.

Characteristic	Group 1 n (%)	Group 2 n (%)	Group 3 n (%)	P value
Age	53 ± 13	54 ± 10	52 ± 12	0.447
Gender (Male)	129 (77.25)	150 (75.00)	37 (75.51)	0.879
Etiology of cirrhosis				
Alcohol	69 (41.3)	64 (32.0)	18 (36.7)	0.182
HBV	22 (13.2)	31 (15.5)	13 (26.5)	0.078
HCV	6 (3.6)	19 (9.5)	3 (6.1)	0.079
NASH/Cryptogenic	54 (32.4)	53 (26.5)	11 (22.4)	0.291
AIH	11 (6.6)	18 (9.0)	1 (2.0)	0.223
Others	5 (3.1)	13 (6.5)	3 (6.0)	0.168
MELD score	15 ± 8	14 ± 8	14 ± 5	0.326

underwent screening for varices at diagnosis while the screening rate was still poor in patients diagnosed at non-study centers as per available records, screening rate in this group being 39% only. The screening rate differences were quite significant amongst groups, clearly suggesting higher screening rates in group 1. Amongst patients who underwent screening for varices, proportion of patients with large varices was around 45, 34 and 68% in the three groups, difference being significant between groups 2 and 3. This difference was probably a bias, as in the group 3 which had the highest percentage of larger varices amongst the screened population, 12 patients of 19 screened had a history of upper GI bleed, thereby increasing the proportion of patients with larger varices in spite of poor screening rate. Amongst the three groups with large varices with or without history of upper GI bleed, proportion of patients receiving non-selective beta blocker or endoscopic variceal ligation as a primary or secondary prophylaxis was 90, 77 and 85%, differences being non-significant across individual groups.

Screening for ascites, ascitic fluid analysis and SBP prophylaxis

All patients diagnosed during the study period underwent ultrasound examination at diagnosis, to determine cirrhosis as well as presence of significant ascites (Table 3). In patients previously diagnosed as cirrhosis either by study centers or non-study centers, we assessed number of patients who had undergone at least two ultrasound examinations, one at diagnosis and other at least 3 month apart to determine ascites. Whereas all patients in group 1 were screened for ascites, only around 75 and 49% patients in groups 2 and 3 underwent screening of ascites (p values 0.001 or less across groups). However this included patients who also had clinical ascites. Amongst patients who were screened, proportion of patients who had significant ascites (grade 2 or 3 ascites

by IAC criteria) was 60, 70 and 38% in the three groups, respectively. The difference in proportions was significant between groups 2 and 3 (p value 0.002). Amongst the patients with significant ascites, ascitic fluid analyses was done in 64, 57 and 67% patients, respectively in three groups (p values non-significant across groups). Thus only around 2/3rd of patients across groups underwent ascitic fluid analyses to determine presence of high risk ascites or SBP. Amongst patients in whom ascites fluid analyses was done high risk ascites or evidence of SBP was present in 80, 90 and 100%, respectively in 3 groups. The difference was significant between groups 1 and 3; however the numbers being too small in 3rd group, this could be a bias. Amongst patients with high risk ascites, or evidence of SBP, primary or secondary prophylaxis was given in 94, 60 and 67%. Thus, prophylaxis was given in only 2/3rd patients previously diagnosed by us or non-study centers, whereas after setting the protocol, > 90% patients with high risk ascites/SBP received prophylaxis.

Assessment of renal function at baseline

We evaluated the frequency of assessment of renal function at baseline in patients with cirrhosis in each group at diagnosis, by looking at serum creatinine estimations done at baseline (Table 4). All patients diagnosed as cirrhosis at the study centers during the protocol period underwent serum creatinine estimation. As compared to that, serum creatinine was done in 72 and 81% patients in groups 2 and 3. This differences between group 1, 2 and 3 were statistically significant (p values < 0.001).

Screening for hepatocellular carcinoma

We assessed the frequency with which alpha-fetoprotein was done at point of diagnosis in patients in 3 groups

Table 2. Endoscopic screening for varices and reception of prophylaxis.

Parameter	Group 1 (%)	Group 2 (%)	Group 3 (%)	P Value between		
				Group 1 and 2	Group 1 and 3	Group 2 and 3
No. of patients screened for varices	152/167 (91.02)	130/200 (65.00)	19/49 (38.78)	<0.001	<0.001	0.001
No. of patients who had large varices amongst those screened	68/152 (44.74)	44/130 (33.85)	13/19 (68.42)	0.063	0.052	0.004
Pts with large varices on BB/ EVL prophylaxis	61/68 (89.71)	34/44 (77.27)	11/13 (84.61)	0.074	0.598	0.596

Table 3. Ascites screening practices and imparting of prophylaxis.

Parameter	Group 1	Group 2 (%)	Group 3 (%)	P Value between		
				Group 1 and 2	Group 1 and 3	Group 2 and 3
No. of patients screened for ascites	167/167 (100)	152/200 (76.00)	24/49 (48.97)	<0.001	<0.001	0.001
No. of patients with significant ascites in the screened patients	99/167 (59.28)	106/152 (69.74)	9/24 (37.50)	0.052	0.044	0.002
No. of patients with significant ascites who underwent ascitic fluid analyses	63/99 (63.64)	60/106 (56.60)	6/9 (66.67)	0.307	0.858	0.572
No. of patients with high risk ascites amongst those who underwent analyses	51/63 (80.95)	54/60 (90)	6/6 (100)	0.158	<0.001*	0.424*
No. of patients with high risk ascites put on prophylaxis	48/51 (94.12)	32/54 (59.26)	4/6 (66.67)	<0.001	0.252*	0.731

*p value when equal variances not assumed, Levene's test significant

Table 4. Assessment of renal function at diagnosis using serum creatinine estimation.

Parameter	Group 1 (%)	Group 2 (%)	Group 3 (%)	P Value between		
				Group 1 and 2	Group 1 and 3	Group 2 and 3
Screening of renal function by serum creatinine	167/167 (100)	145/200 (72.5)	40/49 (81.63)	<0.001	<0.001	0.191

(Table 5). AFP was done in 43, 38 and 6% patients in 3 groups, respectively. The rates were similar at study centers before and after protocol (p value 0.276), but were significantly poor in those diagnosed at non-study centers (p values being < 0.001). In groups 2 and 3, who were already diagnosed as cirrhosis, we assessed number of patients who had been diagnosed as

cirrhosis at least 6 months back and were on regular 6 monthly ultrasound evaluation schedules as screening for hepatocellular carcinoma. 126 patients in group 2 and 26 patients in group 3 qualified for screening, of which 53 and 38% patient in each group were receiving 6 monthly ultrasonography (USG) screening for HCC, this difference was not significant (p value 0.075).

Surveillance for hepato-pulmonary syndrome and portopulmonary hypertension

We assessed pulse oximetry screening practice in patients at diagnosis in 3 groups as also echocardiography evaluation in the enrolled patients. 117 patients out of 167 (70%) diagnosed as cirrhosis during the protocol period underwent

Table 5. AFP and USG screening for HCC.

Parameter	Group 1 (%)	Group 2 (%)	Group 3 (%)	P Value between		
				Group 1 and 2	Group 1 and 3	Group 2 and 3
No. of patients with AFP done at diagnosis	72/167 (43.11)	75/200 (37.5)	3/49 (6.12)	0.276	<0.001	<0.001
Patients on 6 monthly USG surveillance	--	67/126 (53.17)	10/26 (38.46)	--	--	0.075

pulse oximetry evaluation to detect hypoxia, orthodeoxia as markers of HPS. None of the patients in the other two groups had undergone pulse oximetry at diagnosis. However, 185 of these 249 patients of groups 2 and 3 (74.30%) underwent pulse oximetry at study centers during the protocol period. Similarly, echocardiography was done in only 14 patients in group 1 (8%) during the protocol period, whereas none of the patients in other two groups had any echocardiography done at diagnosis. However, 74 of these 249 patients of groups 2 and 3 (30%) had echocardiography evaluation done during the protocol period. As a whole group, we diagnosed 10 patients to be having hepato-pulmonary syndrome on transthoracic contrast enhanced echocardiography.

DISCUSSION

The aim of this study was to determine the actual practices in the care of cirrhotics pertaining to various complications associated with it and the adherence to practice guidelines established by various consortiums in real life scenarios. Accordingly, we designed a protocol incorporating various guidelines apart from the routine investigations and treatment carried out in a patient diagnosed as cirrhosis. The protocol was available to all the study investigators. Of the 416 patients enrolled in the study, 167 were diagnosed as having cirrhosis for the first time during the protocol period. We made an attempt to investigate, treat and care for these 167 patients with adherence to protocol as much as possible. We compared these practices, with what we had been previously doing at the study centers in 200 patients previously diagnosed by the study investigators as well in 49 patients who were being treated at non-study centers in the past and now had presented to the study center for further management. The three groups were similar in terms of demographics like age, gender as well as etiology and severity of underlying cirrhosis.

About 30 to 40% of patients with compensated cirrhosis and 60 to 80% of those with decompensation have esophageal varices, and evidence suggests that about a third of those with documented esophageal varices bleed within a period of 2 years from diagnosis (Fogel et al., 1982; Lo et al., 2001). Incidence of newly diagnosed varices is around 5% per year, while incidence of increase in size of the varices is in the order of 10 to 15%

a year. Bleeding from esophageal varices is unpredictable and carries a mortality of 20 to 40% with each bleeding episode (Fogel et al., 1982; Lo et al., 2001). It is known that the complications of portal hypertension do not occur below a HVPG of 10 mm Hg, the risk of variceal bleed is higher when the portal pressure gradient is above 12 mm Hg, and that the goal of treatment of portal hypertension is to reduce below 12 mm Hg. Meta-analyses of various studies have shown that nonselective β -blocker (NSBB) and endoscopic variceal ligation (EVL) are effective as primary and secondary prophylactic therapies to prevent variceal bleeds. However, imparting primary prophylaxis in unselected cirrhotic patients has failed to show any benefit in reducing first bleeds. And hence, endoscopic surveillance of varices to determine their presence, size and red wale signs carries an immense importance to select patients who merit prophylaxis. In our study, > 90% of patients diagnosed as cirrhosis for the first time underwent endoscopy screening while only 65 and 40% of patients diagnosed previously at the study centers or non-study centers had such a screening done. It has been shown that despite evidence based guidelines, only 6 to 22% of patients with large esophageal varices receive primary prophylaxis with NSBBs (Wilbur et al., 2005). In our study, around 90% of patients in group 1 who deserved prophylaxis received either NSBBs or EVL as primary or secondary prophylaxis, which was statistically not different from those in groups 2 and 3 where 77 and 85% deserving patients received any kind of prophylaxis.

Like esophageal varices, presence of ascites in cirrhosis signifies significant portal hypertension. Ascites in cirrhosis is predominantly high risk with low albumin and protein content and carries an inherent risk of spontaneous bacterial peritonitis which is indeed most common type of bacterial infection in hospitalized cirrhotic patients associated with chance of hepatorenal syndrome and subsequent high mortality. Data from a randomized double blind control trial suggests that in a patient with low concentration of ascites protein (< 1 gm/dl) and significant liver disease, primary prophylaxis should be imparted to lower the incidence of first episode of SBP (Fernández et al., 2007). Secondary prophylaxis has to be imparted in those with a previous history of SBP. Kanwal et al. (2012) have shown that for 5 of 8 quality indicators of ascites care (pertaining to abdominal

paracentesis at diagnosis or index hospitalization, ascitic fluid evaluation, and imparting of primary or secondary prophylaxis), less than two third of patients received recommended care even after accounting for possible justified exceptions (Kanwal et al., 2012).

In our study, ascites screening at baseline was done in all the newly diagnosed patients as compared to around 75 and 50% patients in the other two groups. The rates of detection of high risk ascites were similar in three groups. Whereas around 95% of patients in group 1 who underwent ascitic fluid analysis and did merit prophylaxis received one, only around two-thirds in the other two groups received such a prophylaxis. Thus, ascites screening, ascitic fluid analysis and imparting of prophylaxis was significantly poor in patients previously diagnosed as cirrhosis and these rates significantly improved after writing of the protocol.

Renal dysfunction is quite common in cirrhosis. Patients with ascites have a 1 year and 5 year probabilities of 20 and 40% for development of hepatorenal syndrome (Gines et al., 1993). HRS type 1 carries a very poor prognosis. Renal function can also be secondary to various therapies of cirrhosis like diuretics, antiviral agents for HBV and HCV. Thus evaluation of renal function at baseline periodically is important. All our newly diagnosed patients (100%) had their baseline serum creatinine done as compared to 70 to 80% of patients previously diagnosed.

Around 1 to 6% patients with cirrhosis develop HCC annually (Amarapurkar et al., 2009). Survival is poor in most patients with HCC (5-year survival less than 5%) except in patients in the early stage who receive potentially curative therapy. HCC surveillance has been advocated to detect HCC at an early stage, when critical treatment can be applied. Ultrasonography and alpha-fetoprotein estimation every six months have been advocated as screening tools. However, rates of HCC screening vary 16 to 60%. A recent meta-analysis demonstrated that < 20% of the patients with cirrhosis undergo HCC surveillance and the most common cause of lack of surveillance is the failure of physicians to order it. In a study by Poustchi et al. (2005) to investigate the feasibility of randomized control trial in HCC, > 80% patients refused to be in no surveillance strategy (Poustchi et al., 2005). Thus, patients would definitely like to be in a screening program. In our study, AFP estimation was done in 37% patients previously diagnosed by us, which went up to 43% in the protocol driven diagnosed patients, which was still subpar. The screening rate was a paltry 6% in patients diagnosed at non-study centers. Around 50% of our previously diagnosed patients were in a regular 6 monthly ultrasound surveillance program as compared to 38% of those at non study centers.

Hepato-pulmonary syndrome and portopulmonary hypertension are unique pulmonary complications of cirrhosis. Most patients with hepato-pulmonary syndrome

have cirrhosis with varying degrees of portal hypertension. A prevalence of HPS of around 10 to 20% has been reported in cirrhotics listed for liver transplantation. However, there is no clear relation between HPS and degree of hepatic dysfunction and it should be suspected independently of the stage of liver disease. There are no symptoms or signs pathognomonic of HPS and indeed many patients with HPS may be completely asymptomatic. Once established, there is a progressive deterioration of arterial oxygenation even in a setting of stable liver disease. Diagnosis of HPS is also associated with high mortality. Similarly, portopulmonary hypertension, though a rare complication of portal hypertension, carries a dreadful prognosis. Transthoracic echocardiography (contrast enhanced for HPS) is the most important screening test to diagnose above pulmonary complications (Grace and Angus, 2013; Porres-Aguilar et al., 2013). However; these entities are commonly neglected in daily clinical practice. In our study, none of the patients previously diagnosed at study centers or non-study centers had undergone pulse oximetry or transthoracic echocardiography at diagnosis. Though we could achieve pulse oximetry screening in almost 70% of our newly diagnosed patients, we still could do echocardiography in a minuscule percentage of patients.

Our study had certain limitations. First, the 3rd group of our study had too few a patients as compared to the other two groups. This could have affected few statistical results. Secondly, this was a short term study for a period of three months, during which all those involved in the care of the patients were sensitized to the new protocol. However, long term adherence to the protocol has not been studied. Thirdly, the effect of new protocol on the long term survival benefit of the patients was not studied.

Thus, we conclude that in spite availability of guidelines, surveillance practices for various complications of cirrhosis are not adequately followed in real life clinical practice, even at tertiary care centers. Presence of a dedicated protocol based on these guidelines definitely helped us improve our surveillance strategies. Compliance with guidelines would definitely help us to take better care of our patients.

Conflict of interest

The author declared he has no conflict of interest.

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The background of the entire page is a microscopic image of green, spherical cells, possibly yeast or bacteria, with some showing internal structures like nuclei or vacuoles. The cells are arranged in a cluster, and the lighting creates a soft, glowing effect.

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