

# International Journal of Medicine and Medical Sciences

Volume 8 Number 2 February, 2016  
ISSN 2006-9723



*Academic  
Journals*

## ABOUT IJMMS

The **International Journal of Medicine and Medical Sciences** is published monthly (one volume per year) by Academic Journals.

The **International Journal of Medicine and Medical Sciences (IJMMS)** provides rapid publication (monthly) of articles in all areas of Medicine and Medical Sciences such as:

**Clinical Medicine:** Internal Medicine, Surgery, Clinical Cancer Research, Clinical Pharmacology, Dermatology, Gynaecology, Paediatrics, Neurology, Psychiatry, Otorhinolaryngology, Ophthalmology, Dentistry, Tropical Medicine, Biomedical Engineering, Clinical Cardiovascular Research, Clinical Endocrinology, Clinical Pathophysiology, Clinical Immunology and Immunopathology, Clinical Nutritional Research, Geriatrics and Sport Medicine

**Basic Medical Sciences:** Biochemistry, Molecular Biology, Cellular Biology, Cytology, Genetics, Embryology, Developmental Biology, Radiobiology, Experimental Microbiology, Biophysics, Structural Research, Neurophysiology and Brain Research, Cardiovascular Research, Endocrinology, Physiology, Medical Microbiology

**Experimental Medicine:** Experimental Cancer Research, Pathophysiology, Immunology, Immunopathology, Nutritional Research, Vitaminology and Etiology

**Preventive Medicine:** Congenital Disorders, Mental Disorders, Psychosomatic Diseases, Addictive Diseases, Accidents, Cancer, Cardiovascular Diseases, Metabolic Disorders, Infectious Diseases, Diseases of Bones and Joints, Oral Preventive Medicine, Respiratory Diseases, Methods of Epidemiology and Other Preventive Medicine

**Social Medicine:** Group Medicine, Social Paediatrics, Medico-Social Problems of the Youth, Medico-Social Problems of the Elderly, Rehabilitation, Human Ecology, Environmental Toxicology, Dietetics, Occupational Medicine, Pharmacology, Ergonomy, Health Education, Public Health and Health Services and Medical Statistics The Journal welcomes the submission of manuscripts that meet the general criteria of significance and scientific excellence. Papers will be published approximately one month after acceptance. All articles published in IJMMS are peer-reviewed.

### Contact

Editorial Office: [ijmms@academicjournals.org](mailto:ijmms@academicjournals.org)

Desk: [helpdesk@academicjournals.org](mailto:helpdesk@academicjournals.org)

Website: <http://www.academicjournals.org/journal/IJMMS>

Submit manuscript online <http://ms.academicjournals.me/>

## **Editors**

### **Dr. J. Ibekwe**

*Acting Editor-in-chief,  
International Journal of Medicine and Medical  
Sciences Academic Journals  
E-mail: [ijmms.journals@gmail.com](mailto:ijmms.journals@gmail.com)  
<http://www.academicjournals.org/ijmms>*

### **Afrozul Haq**

*Editor, Laboratory Medicine  
Department of Laboratory Medicine  
Sheikh Khalifa Medical City  
P.O. Box 51900, ABU DHABI  
United Arab Emirates*

## Editorial Board

**Chandrashekhar T. Sreeramareddy**

*Department of Community Medicine,  
P O Box No 155, Deep Heights  
Manipal College of Medical Sciences,  
Pokhara,  
Nepal*

**Sisira Hemananda Siribaddana**

*259, Temple Road, Thalapathpitiya,  
Nugegoda, 10250  
Sri Lanka*

**Dr. santi M. Mandal**

*Internal Medicine  
UTMB, Galveston, TX,  
USA*

**Konstantinos Tziomalos**

*Department of Clinical Biochemistry  
(Vascular Prevention Clinic),  
Royal Free Hospital Campus,  
University College Medical School, University College  
London, London,  
United Kingdom*

**Cyril Chukwudi Dim**

*Department of Obstetrics & Gynaecology  
University of Nigeria Teaching Hospital (UNTH)  
P.M.B. 01129, Enugu. 400001,  
Nigeria*

**Mojtaba Salouti**

*School of Medical and Basic Sciences,  
Islamic Azad University- Zanjan,  
Iran*

**Imtiaz Ahmed Wani**

*Srinagar Kashmir, 190009,  
India*

**Professor Viroj Wiwanitkit**

*Wiwanitkit House, Bangkhae,  
Bangkok  
Thailand 10160*

**Dr. Srinivas Koduru**

*Dept of Clinical Sciences  
Collage of Health Sciences  
University of Kentucky  
Lexington USA*

**Weiping Zhang**

*Department of Oral Biology  
Indiana University School of Dentistry  
1121 West Michigan Street, DS 271  
Indianapolis, IN 46202  
USA*

**Lisheng XU**

*Ho Sin Hang Engineering Building  
Department of Electronic Engineering  
The Chinese University of Hong Kong  
Shatin, N.T. Hong Kong,  
China*

**Dr. Mustafa Sahin**

*Department of Endocrinology and Metabolism  
Baskent University,  
Ankara,  
Turkey*

**Dr. Harshdeep Joshi**

*Maharishi Markandeshwar  
Institute of Medical Sciences and Research  
Ambala, (Haryana).  
India.*

# Instructions for Author

**Electronic submission** of manuscripts is strongly encouraged, provided that the text, tables, and figures are included in a single Microsoft Word file (preferably in Arial font).

The **cover letter** should include the corresponding author's full address and telephone/fax numbers and should be in an e-mail message sent to the Editor, with the file, whose name should begin with the first author's surname, as an attachment.

## Article Types

Three types of manuscripts may be submitted:

**Regular articles:** These should describe new and carefully confirmed findings, and experimental procedures should be given in sufficient detail for others to verify the work. The length of a full paper should be the minimum required to describe and interpret the work clearly.

**Short Communications:** A Short Communication is suitable for recording the results of complete small investigations or giving details of new models or hypotheses, innovative methods, techniques or apparatus. The style of main sections need not conform to that of full-length papers. Short communications are 2 to 4 printed pages (about 6 to 12 manuscript pages) in length.

**Reviews:** Submissions of reviews and perspectives covering topics of current interest are welcome and encouraged. Reviews should be concise and no longer than 4-6 printed pages (about 12 to 18 manuscript pages). Reviews are also peer-reviewed.

## Review Process

All manuscripts are reviewed by an editor and members of the Editorial Board or qualified outside reviewers. Authors cannot nominate reviewers. Only reviewers randomly selected from our database with specialization in the subject area will be contacted to evaluate the manuscripts. The process will be blind review.

Decisions will be made as rapidly as possible, and the journal strives to return reviewers' comments to authors as fast as possible. The editorial board will re-review manuscripts that are accepted pending revision. It is the goal of the IJMMS to publish manuscripts within weeks after submission.

## Regular articles

All portions of the manuscript must be typed **double-spaced** and all pages numbered starting from the title page.

The **Title** should be a brief phrase describing the contents of the paper. The Title Page should include the authors' full names and affiliations, the name of the corresponding author along with phone, fax and E-mail information. Present addresses of authors should appear as a footnote.

The **Abstract** should be informative and completely self-explanatory, briefly present the topic, state the scope of the experiments, indicate significant data, and point out major findings and conclusions. The Abstract should be 100 to 200 words in length. Complete sentences, active verbs, and the third person should be used, and the abstract should be written in the past tense. Standard nomenclature should be used and abbreviations should be avoided. No literature should be cited.

Following the abstract, about 3 to 10 **key words** that will provide indexing references should be listed.

A list of non-standard **Abbreviations** should be added. In general, non-standard abbreviations should be used only when the full term is very long and used often. Each abbreviation should be spelled out and introduced in parentheses the first time it is used in the text. Only recommended SI units should be used. Authors should use the solidus presentation (mg/ml). Standard abbreviations (such as ATP and DNA) need not be defined.

The **Introduction** should provide a clear statement of the problem, the relevant literature on the subject, and the proposed approach or solution. It should be understandable to colleagues from a broad range of scientific disciplines.

**Materials and methods** should be complete enough to allow experiments to be reproduced. However, only truly new procedures should be described in detail; previously published procedures should be cited, and important modifications of published procedures should be mentioned briefly. Capitalize trade names and include the manufacturer's name and address. Subheadings should be used. Methods in general use need not be described in detail.



**Results** should be presented with clarity and precision.

The results should be written in the past tense when describing findings in the authors' experiments. Previously published findings should be written in the present tense. Results should be explained, but largely without referring to the literature. Discussion, speculation and detailed interpretation of data should not be included in the Results but should be put into the Discussion section.

The **Discussion** should interpret the findings in view of the results obtained in this and in past studies on this topic. State the conclusions in a few sentences at the end of the paper. The Results and Discussion sections can include subheadings, and when appropriate, both sections can be combined.

The **Acknowledgments** of people, grants, funds, etc should be brief.

**Tables** should be kept to a minimum and be designed to be as simple as possible. Tables are to be typed double-spaced throughout, including headings and footnotes. Each table should be on a separate page, numbered consecutively in Arabic numerals and supplied with a heading and a legend. Tables should be self-explanatory without reference to the text. The details of the methods used in the experiments should preferably be described in the legend instead of in the text. The same data should not be presented in both table and graph form or repeated in the text.

**Figure legends** should be typed in numerical order on a separate sheet. Graphics should be prepared using applications capable of generating high resolution GIF, TIFF, JPEG or Powerpoint before pasting in the Microsoft Word manuscript file. Tables should be prepared in Microsoft Word. Use Arabic numerals to designate figures and upper case letters for their parts (Figure 1). Begin each legend with a title and include sufficient description so that the figure is understandable without reading the text of the manuscript. Information given in legends should not be repeated in the text.

**References:** In the text, a reference identified by means of an author's name should be followed by the date of the reference in parentheses. When there are more than two authors, only the first author's name should be mentioned, followed by 'et al'. In the event that an author cited has had two or more works published during the same year, the reference, both in the text and in the reference list, should be identified by a lower case letter like 'a' and 'b' after the date to distinguish the works.

Examples:

Nishimura (2000), Agindotan et al. (2003), (Kelebeni, 1983), (Usman and Smith, 2001), (Chege, 1998; Stein, 1987a,b; Tijani, 1993,1995), (Kumasi et al., 2001)  
References should be listed at the end of the paper in alphabetical order. Articles in preparation or articles submitted for publication, unpublished observations, personal communications, etc. should not be included in the reference list but should only be mentioned in the article text (e.g., A. Kingori, University of Nairobi, Kenya, personal communication). Journal names are abbreviated according to Chemical Abstracts. Authors are fully responsible for the accuracy of the references.

Examples:

Giesielski SD, Seed TR, Ortiz JC, Melts J (2001). Intestinal parasites among North Carolina migrant farm workers. *Am. J. Public Health.* 82: 1258-1262

Stoy N, Mackay GM, Forrest CM, Christofides J, Egerton M, Stone TW, Darlington LG (2005). Tryptophan metabolism and oxidative stress in patients with Huntington's disease. *N. J. Neurochem.* 93: 611-623.

Mussel RL, De Sa Silva E, Costa AM, Mandarim-De-Lacerda CA (2003). Mast cells in tissue response to dentistry materials: an adhesive resin, a calcium hydroxide and a glass ionomer cement. *J. Cell. Mol. Med.* 7:171-178.

Booth M, Bundy DA, Albonico P, Chwaya M, Alawi K (1998). Associations among multiple geohelminth infections in school children from Pemba Island. *Parasitol.* 116: 85-93.0.

Fransiscus RG, Long JC (1991). Variation in human nasal height and breath, *Am. J. Phys. Anthropol.* 85(4):419-427.

Stanislowski L, Lefeuvre M, Bourd K, Soheili-Majd E, Goldberg M, Perianin A (2003). TEGDMA-induced toxicity in human fibroblasts is associated with early and drastic glutathione depletion with subsequent production of oxygen reactive species. *J. Biomed. Res.* 66:476-82.

### Case Studies

Case Studies include original case reports that will deepen the understanding of general medical knowledge

The **Title** should be a brief phrase describing the contents of the paper. The Title Page should include the authors' full names and affiliations, the name of the corresponding author along with phone, fax and E-mail information. Present addresses of authors should appear as a footnote.

The **Abstract** should be informative and completely self-explanatory, briefly present the topic, state the scope of the experiments, indicate significant data, and point out major findings and conclusions. The Abstract should be 100 to 200 words in length. Complete sentences, active verbs, and the third person should be used, and the abstract should be written in the past tense. Standard nomenclature should be used and abbreviations should be avoided. No literature should be cited.

Following the abstract, about 3 to 10 **key words** that will provide indexing references should be listed.

A list of non-standard **Abbreviations** should be added. In general, non-standard abbreviations should be used only when the full term is very long and used often. Each abbreviation should be spelled out and introduced in parentheses the first time it is used in the text. Only recommended SI units should be used. Authors should use the solidus presentation (mg/ml).

The **Introduction** should provide a clear statement of the problem, the relevant literature on the subject, and the proposed approach or solution. It should be understandable to colleagues from a broad range of scientific disciplines.

The presentation of the case study should include the important information regarding the case. This must include the medical history, demographics, symptoms, tests etc. Kindly note that all information that will lead to the identification of the particular patient(s) must be excluded

The conclusion should highlight the contribution of the study and its relevance in general medical knowledge

The **Acknowledgments** of people, grants, funds, etc should be brief.

**References:** Same as in regular articles

### Short Communications

Short Communications are limited to a maximum of two figures and one table. They should present a complete study that is more limited in scope than is found in full-length papers. The items of manuscript preparation listed above apply to Short Communications with the following differences: (1) Abstracts are limited to 100 words; (2) instead of a separate Materials and Methods section, experimental procedures may be incorporated into Figure Legends and Table footnotes; (3) Results and Discussion should be combined into a single section.

**Proofs and Reprints:** Electronic proofs will be sent (e-mail attachment) to the corresponding author as a PDF file. Page proofs are considered to be the final version of the manuscript. With the exception of typographical or minor clerical errors, no changes will be made in the manuscript at the proof stage. Because IJMMS will be published freely online to attract a wide audience, authors will have free electronic access to the full text (in both HTML and PDF) of the article. Authors can freely download the PDF file from which they can print unlimited copies of their articles.

**Copyright:** Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, or thesis) that it is not under consideration for publication elsewhere; that if and when the Manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher.

ARTICLES

- Effects of *Phoenix dactylifera* on the prostate and seminal vesicle of Wistar rats** 8  
N. I. Dibal, J. O. Hambolu and A. A. Buraimoh
- Relationship between road traffic law violation, accident and psychoactive substance use among commercial motorcycle operators in Kano, Northwestern Nigeria** 15  
Mustapha Ibrahim Gudaji and Faisal Saleh Dankishiya



Full Length Research Paper

## Effects of *Phoenix dactylifera* on the prostate and seminal vesicle of Wistar rats

N. I. Dibal<sup>1\*</sup>, J. O. Hambolu<sup>2</sup> and A. A. Buraimoh<sup>3</sup>

<sup>1</sup>Department of Human Anatomy, University of Maiduguri, Nigeria.

<sup>2</sup>Department of Veterinary Anatomy, Ahmadu Bello University Zaria, Nigeria.

<sup>3</sup>Department of Human Anatomy, Kaduna State University, Kaduna, Nigeria.

Received 7 October, 2015; Accepted 18 November, 2015

*Phoenix dactylifera*, a member of the family *Arecaceae*, is a highly nutritious fruit that is rich in vitamins, simple sugars, flavonoids, saponins, tannins, carotenoids and steroids. The study is aimed at evaluating the possible effects of *P. dactylifera* on the prostate and seminal vesicle of Wistar rats so that it can be suggested for use in the treatment of infertility or as a natural male contraceptive. Twenty male Wistar rats were used for the study; they were divided into four groups of five rats each, group 1 served as the control and were given distilled water while groups 2 to 4 (experimental groups) received the extract at 250, 500 and 1000 mg/kg body weight orogastrically for 35 days. On the 36th day, all the rats were sacrificed using cervical dislocation method and the prostate gland and seminal vesicles were dissected, weighed and processed for light microscopic study. The results showed degeneration of prostate connective tissue and distorted glands in rats treated with the extract compared to that of the control. The seminal vesicles of rats treated with the extract showed no difference as compared to that of the control. In conclusion, the extract might affect sperm function by reducing sperm quality and viability as secretions from prostate helps in creating an alkaline pH that resist the acidity of the vaginal fluids. Therefore, *P. dactylifera* fruits might be used as a natural male contraceptive if the effects are found to be reversible in Human prostate.

**Key words:** Prostate, seminal vesicle, Wistar rats, *P. dactylifera*, sperm quality, semen.

### INTRODUCTION

*Phoenix dactylifera* (Date palm), a member of the family *Arecaceae*, is a plant with highly nutritious fruit and is a staple food for the people of North Africa and Middle East, where hundreds of varieties are grown for domestic and commercial purposes (Forbes, 1971). Although its

place of origin is unknown because of long cultivation, the plant probably originate from lands around Iraq (Mesopotamia) and its cultivation spread to the Arabian Peninsula, North Africa, and the Middle Eastern Countries, possibly as early as 4000 BCE (Janick, 2005;

\*Corresponding author. E-mail: [nathandibal@gmail.com](mailto:nathandibal@gmail.com); +2348069088308.

**Table 1.** Body and organs weight of Rats treated with aqueous extract of *P. dactylifera*.

Parameter	Control	Groups 250 mg/kg	500 mg/kg	1000 mg/kg
Body weight (g)	77.20±2.69	60.00±4.52	82.00±2.98	71.80±7.23
Left Seminal vesicle (g)	0.094±0.016	0.136±0.025	0.118±0.017	0.140±0.014
Right Seminal vesicle(g)	0.088±0.017	0.112±0.019	0.096±0.016	0.144±0.028
Prostate gland (g)	0.278±0.013	0.288±0.055	0.228±0.028	0.316±0.058

All values expressed as Mean±SEM. Values with the same super script in the same row are significantly different at  $P \leq 0.05$  using one-way analysis of variance (ANOVA). SEM = standard error of the mean.

Zohary et al., 2012). The date fruit is rich in simple sugars, vitamin C, flavonoids, saponins, tannins, steroids and carotenoids (Agboola and Adejumo, 2013; Sadiq et al., 2013). Dates have numerous therapeutics effects in both human and animals therefore, it is widely used for the treatment of various ailment and illnesses ranging from ulcer and gastric lesions (Gangwar et al., 2014), enhancing growth in chickens, sheep, fish and rats (Ali and Bashir, 1999) to the inhibition of the cancerous cell growth (Al-Juraisy et al., 2010).

The pollen grains of date palm were used to promote fertility in women while the male flowers were used to enhance fertility in ancient Egypt (Bajpayee, 1997). The prevalence of infertility is higher in developing/underdeveloped countries where limited resources are available for diagnosis and treatment, and a significant proportions of couples that experience fertility problems are affected by it social and psychological effects (CDC, 2014; Hamada et al., 2011) while 50% of infertility cases are as a result of male factor (Jarow et al., 2002). The aim of the study is to evaluate the possible effects of aqueous extract of *P. dactylifera* fruit on the prostate and seminal vesicle of Wistar rats so that it can be suggested for use in the treatment of infertility or as a natural male contraceptive.

## MATERIALS AND METHODS

### Preparation of extract

The fruit was purchased from a local salesman in Samaru market Zaria. The extraction was done in the Department of Pharmacognosy, Ahmadu Bello University (ABU) Zaria, Kaduna State. The fruit was opened and the fleshy part was oven dried and grounded to powder. It was soaked in maceration apparatus with distilled water for 24 h, filtered and allowed to settle down, it was then decanted and oven dried at 50°C.

### Experimental design

Twenty Wistar rats were purchased from the Animal House, Department of Human Anatomy, ABU Zaria and were kept and treated according to standard laboratory conditions. The Rats were randomized into four groups of five rats each and were kept under standard laboratory condition (12 h light/12 h dark cycle), fed with standard feed pellets (Grower's marsh, Vital Feed, Grand Cereal, Nigeria) and water *ad libitum*. The rats in group I (control) were

given distilled water while Group II-IV received the extract at (250, 500 and 1000mg/kg, respectively) oro-gastrically by intubation once daily for 35 days (Mehraban et al., 2014).

### Histopathology

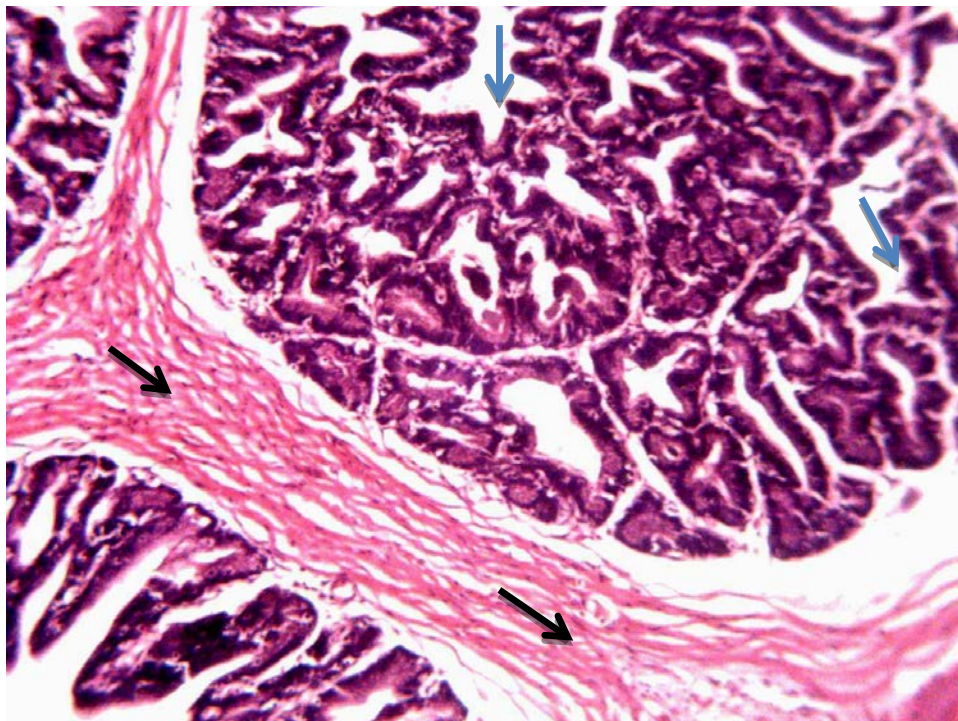
All Animals were sacrificed on the 36th day by cervical dislocation method and the prostate and seminal vesicles were dissected and weighed by using a chemical balance. They were fixed in Neutral Buffered Formalin (NBF), embedded in paraffin wax, at 5 µm and stained with heamatoxylin and eosin (H & E).

## RESULTS AND DISCUSSION

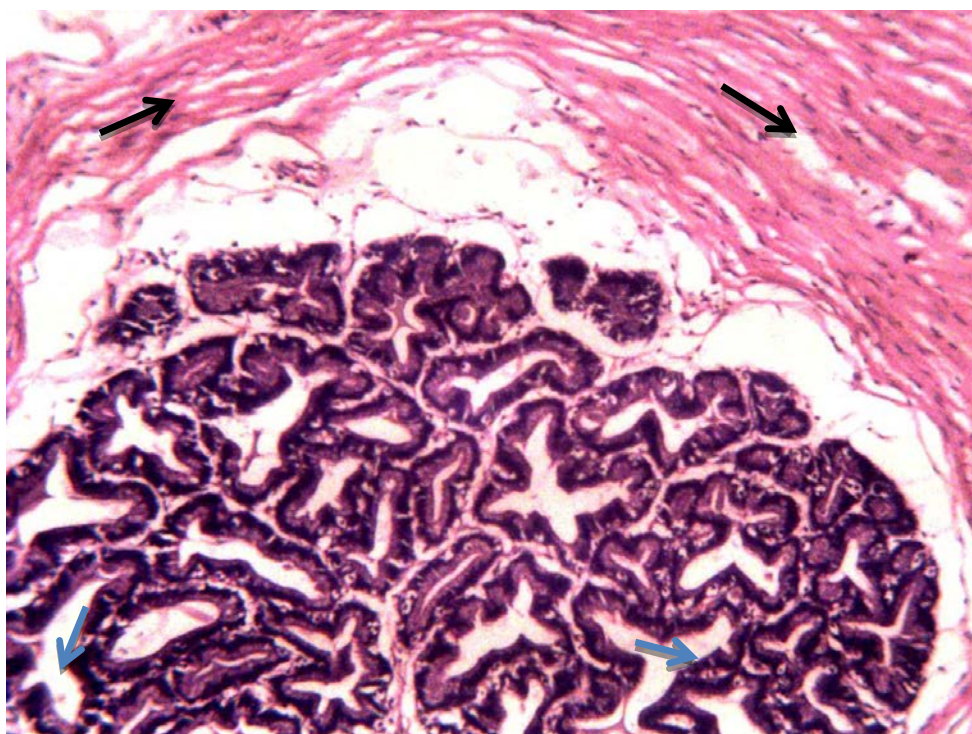
Animals treated with the extract did not show any significant change in body/organ weight compared to that of the control (Table 1). This shows that the extract has no significant effect on metabolism. This is similar to a study conducted by Bahmanpour et al. (2006, 2013) indicating no significant change in the prostate and seminal vesicular weight following the administration of date palm gemules/pollen to Rats. There were no changes in the structure of the seminal vesicle of rats treated with *P. dactylifera* extract (Figures 2, 3 and 4) compared to that of the control (Figure 1) signifying that the extract has no negative effect on the seminal vesicles and will not affect their functions. The prostate glands of the rats treated with the extract showed destruction of connective tissues (Figure 6) and distorted glands (Figures 7 and 8) compared to that of the control (Figure 5). This is an indication that the extract could affect prostate function by reducing sperm quality/viability as secretions from the prostate constitute bulk of the semen, helps in the nourishment of sperm cells and create an alkaline pH that resist the acidity of the vaginal fluids (Guyton and Hall, 2006; Mann, 1974). Therefore, any impairment damage to the prostate will affect fertility by reducing sperm quality/viability.

### Conclusion

Administration of aqueous extract of *P. dactylifera* fruit to male Wistar rats at 250, 500 and 1000 mg/kg for 35 days results in degeneration of prostate connective tissues and

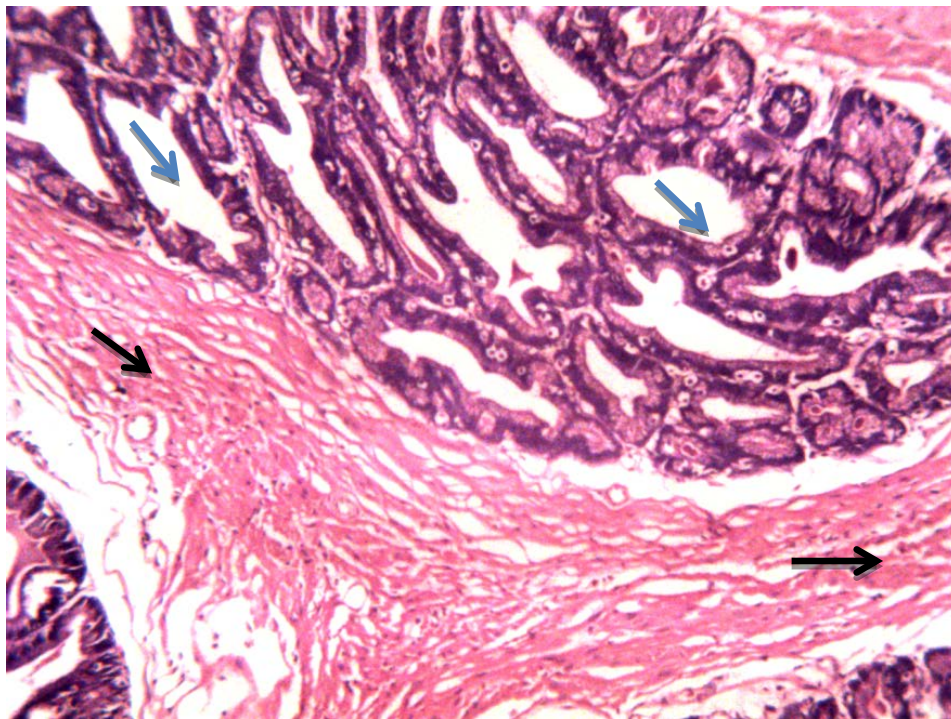


**Figure 1.** Photomicrograph of seminal vesicle of control rats illustrating the typical structure of the seminal vesicle showing the glands (light blue arrows) and smooth muscle (black arrows) H and E x100.

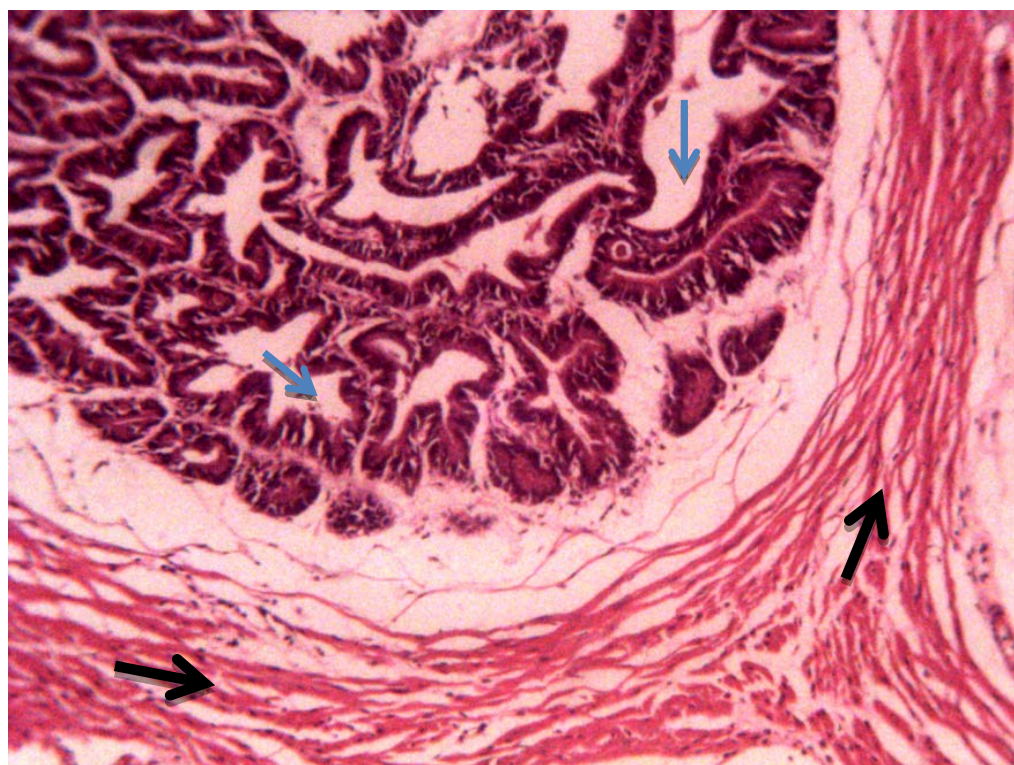


**Figure 2.** Photomicrograph of seminal vesicle of Rats treated with aqueous extract of *P. dactylifera*at 250 mg/kg showing the normal architecture with normal glands (light blue arrows) and smooth muscle layer (black arrows) H and E x100



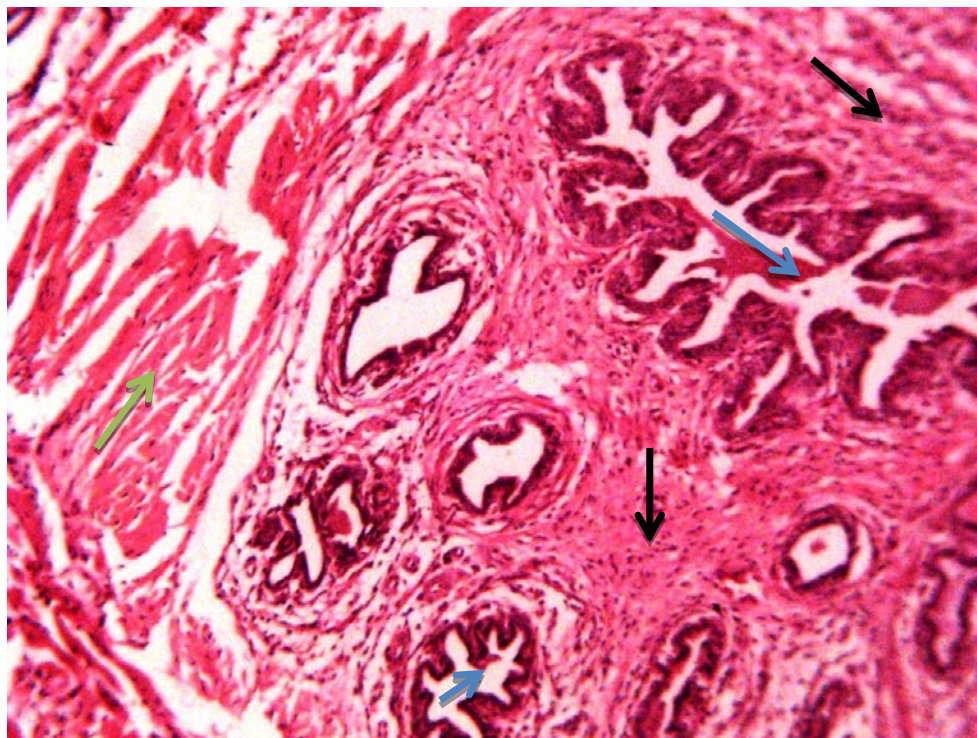


**Figure 3.** Photomicrograph of seminal vesicle of Rats treated with aqueous extract of *P. dactylifera* at 500 mg/kg showing normal glands (light blue arrows) and smooth muscles (black arrows) H and E x100.

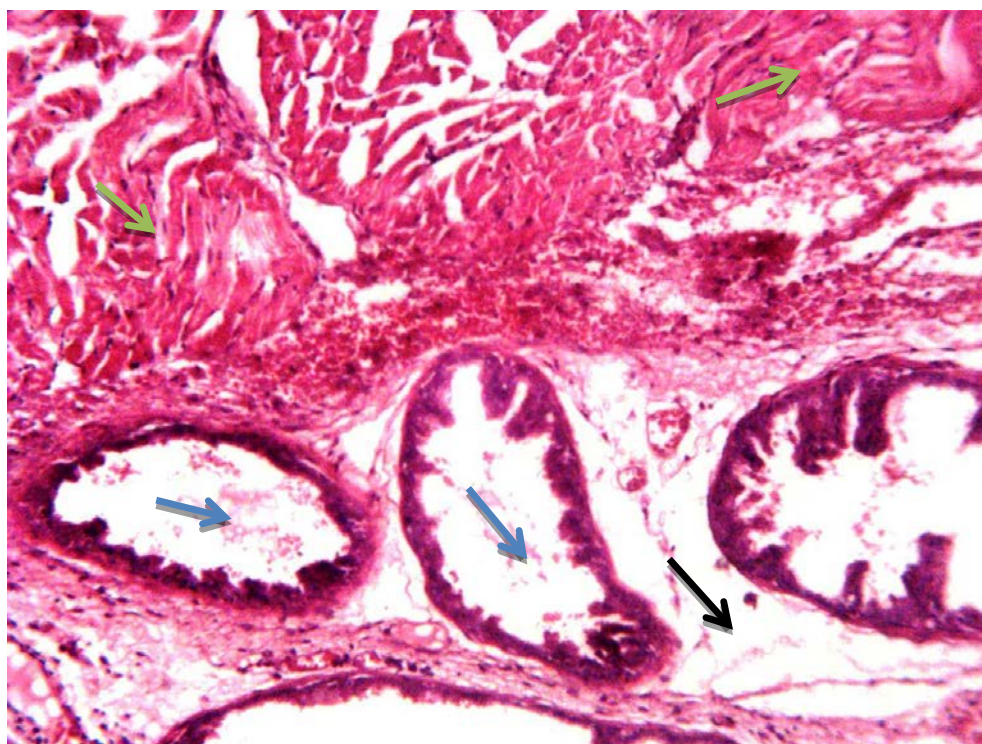


**Figure 4.** Photomicrograph of seminal vesicle of Rats treated with aqueous extract of *P. dactylifera* at 1000mg/kg showing normal glands (light blue arrows) and smooth muscles (black arrows) H and E x100



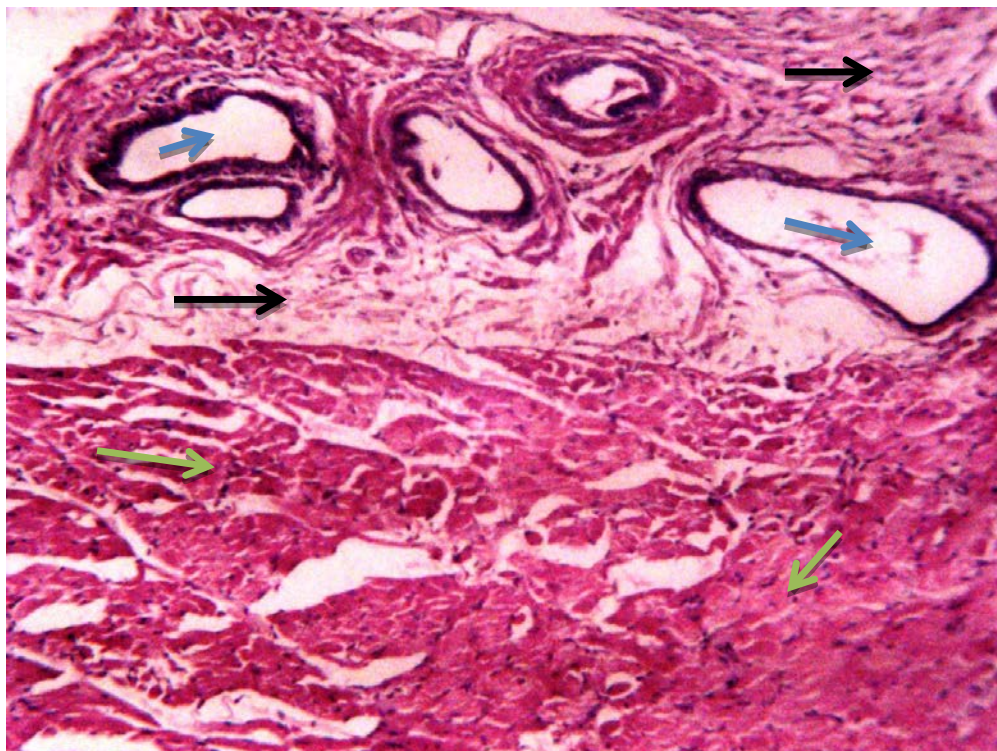


**Figure 5.** Photomicrograph of Prostate gland of control Rats illustrating the typical structure with normal glands (light blue arrows), connective tissues (black arrows) and smooth muscles (green arrow) H and E x100.

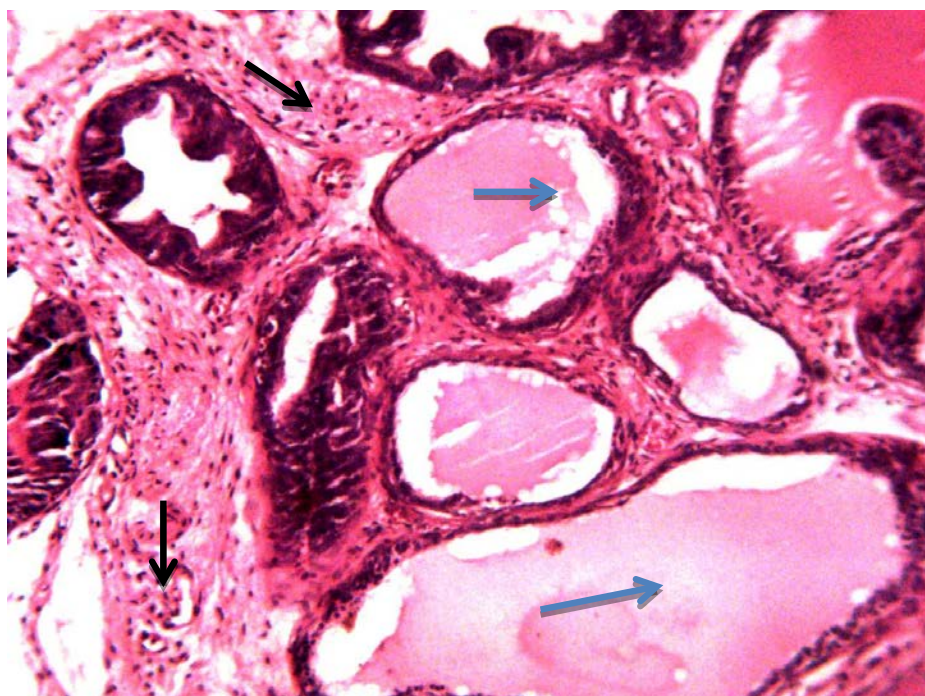


**Figure 6.** Photomicrograph of prostate gland of rats treated with aqueous extract of *P. dactylifera* at 250 mg/kg showing normal smooth muscles (green arrows), degenerated connective tissues (black arrow) and distorted glands (light blue arrows) H and E x100.





**Figure 7.** Photomicrograph of Prostate gland of rats treated with aqueous extract of *P. dactylifera* at 500 mg/kg showing normal smooth muscles (green arrows), normal connective tissues (black arrows) and degenerated glands (light blue arrows) H and E x100.



**Figure 8.** Photomicrograph of prostate gland of rats treated with aqueous extract of *P. dactylifera* at 1000 mg/kg showing normal connective tissues (black arrow) and distorted glands (light blue arrows) H and E x100.

distortion of glands, this might affect prostate function leading to poor sperm quality/viability. Therefore, *P. dactylifera* fruits might be used as a natural male contraceptive if the effects are found to be reversible in Human prostate.

### Conflict of Interests

The authors have not declared any conflict of interests.

### REFERENCES

- Agboola OS, Adejumo AL (2013). Nutritional composition of the fruit of the Nigerian wild Date palm (*Phoenix dactylifera* L.). J. Dairy Food Sci. 8(2):196-200.
- Ali BH, Bashir AG (1999). Reproductive hormonal status of rats treated with date palm pits. Food Chem. 66:437-41.
- Al-Juraisy Y, Yaseem NH, Al-Ani B (2010). Effect of crude extract of fruits and pits of date palm (*Phoenix dactylifera* L.) on some cancer cell lines in-vitro and treatment of transplanted mammary adenocarcinoma in mice. Blessed Tree pp. 36-41.
- Bahmanpour S, Talei T, Vojdani Z, Panjeshahin MR, Poostpasan A, Zareei S, Ghaemini M (2006). Effects of *Phoenix dactylifera* pollen on sperm parameters and reproductive system of Adult Male rats. Iran J. Med. Sci. 31(4):208-212.
- Bahmanpour S, Kavoosi F, Talei T, Panjeshahin MR (2013) Effects of Date palm (*Phoenix dactylifera*) Gemmule extract on Morphometric parameters of reproductive tissues, hormones and sperm quality in rats. Anatomical Sci. 10(3):144-150.
- Bajpayee KK (1997). Ethnobotany of *Phoenix (Archaeae)*. J. Econ. Taxonomic Bot. 21:155-57.
- Center for Disease Control and Prevention (2014). National Public health action plan for the detection, prevention and management of infertility. Center for Disease Control and Prevention. Atlanta Georgia. pp. 1-23.
- Forbes RJ (1971). Studies in Ancient Technology. Book 8, Brill Academic Publishers. ISBN; 978-9004026520.
- Gangwar AK, Ghosh AK, Saxena V (2014). Standardization and anti-ulcer activity of *Phoenix dactylifera* leaves, World J. Pharm. Pharmaceutical Sci. 3(7):1164-1172.
- Guyton AC, Hall JE (2006). Textbook of medical physiology, 11<sup>th</sup> edition, Elsevier saunders. ISBN:0-7216-0240-1.
- Hamada A, Esteves SC, Agarwal A (2011). Unexplained male infertility: Potentials causes and management. Human Andrology 1:2-16.
- Janick J (2005). The origins of fruits, fruit growing, and fruit breeding. Plant Breed. Rev. 25(25):5-320.
- Jarow JP, Sharlip ID, Belker AM, Lipshultz LI, Sigman M, Thomas AJ, Schlegel PN, Howards SS, Nehra A, Damewood MD, Overstreet JW, Sadovsky R (2002). Best practice and Policies for male infertility. J. Urol. 167(5):2138-2144.
- Mann T (1974). Secretory function of the prostate and seminal vesicle and other male accessory organs of the reproduction. J. Reprod. Fertil. 37:179-188.
- Mehraban F, Jafari M, Toori MA, Sadeghi H, Joodi B, Mostafazade M, Sadeghi H (2014). Effect of Date palm Pollen (*Phoenix dactylifera* L.) and *Astralagusovinus* on Sperm parameters and sex hormones in Adult Male Rats. Iran J. Reprod. Med. 12(10):705-712.
- Sadiq IS, Izuagie T, Shuaibu M, Dogoyaro AI, Garba A, Abubakar S (2013). The Nutritional value of Date palm (*Phoenix dactylifera*). Int. J. Modern Chem. 4(3):147-154.
- Zohary D, Hopf M, Weiss E (2012). Review: Domestication of plants in the old World, 4<sup>th</sup> Edition. Oxford University Press 1-4.

*Full Length Research Paper*

## Relationship between road traffic law violation, accident and psychoactive substance use among commercial motorcycle operators in Kano, Northwestern Nigeria

Mustapha Ibrahim Gudaji\* and Faisal Saleh Dankishiya

Department of Psychiatry, College of Health Sciences, Faculty of Clinical Sciences, Bayero University Kano, Nigeria.

Receive 27 November, 2015; Accepted 2 February, 2016

**Motorcycle operators who drive under the influence of psychoactive substances are at high risk for road traffic violations and accidents. Despite the high level of morbidity associated with psychoactive substance use, it is not a well-researched area in Northwestern Nigeria. The aim of the study was to determine the relationship between psychoactive substance use and road traffic violations and accidents among motorcycle operators in Kano, Northwestern Nigeria. It was a descriptive cross-sectional study. Instrument used for data collection included socio-demographic questionnaire and Schedule for Clinical Assessment in Neuropsychiatry (SCAN). Data analysis was done using Statistical Package for Social Sciences (SPSS) 17<sup>th</sup> edition. Three hundred and ninety-four subjects participated in the study. Their age ranged between 22 to 60 years, with mean age of 32.7 years  $\pm$  6.6. Motorcycle operators who used substances were more likely to violate traffic laws ( $P < 0.001$ ; O.R = 1.6 (0.8 – 3.1) and to have road traffic accidents ( $P = 0.004$ ; O.R = 2.6 (1.4 – 4.7) compared to those who did not use substances. Positive correlation was found between road traffic violations, road traffic accidents and substance use status at 99% confidence interval. There was also significant relationship between specific substance use, road traffic violations and accidents. Psychoactive substance use increases the risk of road traffic violations and road traffic accidents among motorcycle operators. Public health measures should be instituted to reduce the rate of substance use among motorcycle operators and cut down its associated morbidity.**

**Key words:** Psycho-active substance, road traffic accidents, road traffic violations, motorcycle operators, Schedule for Clinical Assessment in Neuropsychiatry (SCAN), Nigeria.

### INTRODUCTION

Commercial motorcycle operation is widely adopted in Kano, perhaps for both logistic and socio-economic

\*Corresponding author. E-mail: [mgudaji@yahoo.com](mailto:mgudaji@yahoo.com).



reasons. It is possible that commercial motorcyclists who use psychoactive substances are at higher risk of road traffic accident compared to the general population. However, this is not a well-researched area. Road traffic accident (RTA) represents a major epidemic of non-communicable diseases in Nigeria. It has been recognized as an important public health problem in both developed and developing nations (Adogu et al., 2009).

Among fatal accidents, motorcycle accidents rank first globally (Ozdemir et al., 2005). A large proportion of vehicles involved in accidents are two wheelers, which when compared to cars, are unstable and provide little protection for their riders in accidents (Adogu et al., 2009). RTA and death among motorcyclists is further heightened by apparent reckless speeding, meandering in traffic and show of little regard for other road users. Studies reported that the use of psychoactive substances was found to be associated with the occurrence of road traffic accidents among motorcyclists in Northwestern Nigeria (Crilly, 1998; Marks, 1982; Alti-Muazu and Aliyu, 2008). Motorcycles have a sevenfold increase in accident rate for vehicle person per mile and a 17-fold fatality rate compared with motorcars (Sabey and Stoughton, 1980; Makanjuola et al., 2007). Previous studies have suggested a possible link between psychoactive substance use and accidents (Makanjuola et al., 2007; Lasebikan, 2010).

The relationship between cannabis use and car crash is controversial. Studies have reported increased risk of crash associated with cannabis use (Lasebikan, 2010; Mura, 2003). Some cannabis users who drive on a set course show little or no impairment under the influence of the substance, except if it is combined with alcohol (Lasebikan, 2010). Nigeria has an estimated lifetime consumption of cannabis of 10.8% of which commercial drivers and other motor park operative seem vulnerable (Makanjuola et al, 2007; UNODC, 2007; Lasebikan, 2010). It has been reported that experimentation, curiosity, alertness for study, the belief that psychoactive substance increases the strength for physical work, are the main reasons that people use drugs (Suleiman et al., 2006). Studies showed that the effects of psychoactive substances on the brain could lead to emotional instability, poor impulse control and poor intellectual functioning (SAMHSA, 2009). Berghaus et al. (1995), in a meta-analysis of 60 experimental studies, found that behavioural and cognitive skills related to driving performance were impaired in a dose dependent fashion with increased cannabinoids blood levels. The authors reported that impairment increased significantly when cannabis was combined with alcohol.

The national highway traffic safety administration in America, in a study among fatally injured drivers reported that 18% tested positive for psychoactive substances (NHTSA, 2009). A report by SAMHSA (2009) showed that 4.2% of people in America drive under the influence of psychoactive substances. Alcohol and cannabis were

the most prevalent psychoactive substances detected among impaired drivers. In a responsibility study of main illicit psychoactive substance use among commercial drivers in France, Gadegbeku et al. (2011) reported that the effect of alcohol and cannabis on fatal car crashes responsibility were significant compared to amphetamine, cocaine and opiates. The authors reported a causal relationship between cannabis and road accidents.

In Australia, Drummer et al. (2003) reported a prevalence of 26.7% of psychoactive substance use among fatally injured drivers. The substances used included alcohol (18.6%), cannabis (13.5%), opiates (4.9%), stimulants (4.1%) and benzodiazepines (4.1%). In a study of motorcycle injuries in Tanzania, Chalya et al. (2010) reported that motorcycle accidents constitute 37.2% of all road traffic injuries. They found that there was high use of psychoactive substances among the respondents. Lasebikan and Baiyewu (2009), in a study in Ibadan, south western Nigeria, of problems associated with psychoactive substance use among long distance commercial drivers, reported a prevalence of alcohol use as 77.5%, tobacco (60.5%), cannabis (52.5%) and inhalants (8.1%). The authors reported that road accidents were the most common problems among the respondents, with a prevalence of 26.8%, and were commonest among those respondents with alcohol use disorders.

In a study in Benin-city, Nigeria, of morbidity and mortality among road users, Nzegwu et al. (2008) reported that commercial drivers had an average of BAC of 54.16 mg/dl among those that died in accidents. However, the study was limited to alcohol use. Iribhogbe and Odai (2009), in Benin, Nigeria, in a study of driver related risk factors in commercial motorcycle crashes, reported a prevalence of alcohol use to be 39.8%, tobacco (34.6%), cannabis (0.6%) and cocaine (0.003%).

The only study on substance use among motorcycle operators in Northern Nigeria was by Alti-Mu'azu and Aliyu (2008) in Zaria, North western Nigeria, and it reported a high prevalence (59.5%) of road traffic accidents associated with the use of psychoactive substances. However, the authors did not use standard questionnaire to assess for substance use.

To the best of our knowledge, this is the first study on road traffic accidents among commercial motorcycle operators in Kano, Northwestern Nigeria. The current study aimed to determine the relationship between psychoactive substance use, road traffic violations and accidents among motorcycle operators in Kano, Northwestern Nigeria. We hypothesized that motorcyclists who used psychoactive substances would have more traffic law violations and accidents compared to those who do not use substances.

## METHODOLOGY

This was a descriptive cross-sectional study carried out among 394

commercial motorcycle operators who are registered with the Tarauni Local Government Area branch of Amalgamated Commercial Motorcycle Owner's and Riders Association of Nigeria (ACOMORAN). This is the only umbrella body that registers motorcyclists. However, a good number of the commercial motorcycle operators are not under any association.

Ethical clearance was obtained from the Research Ethical Committee of Aminu Kano Teaching Hospital. Permission for the study was obtained from National Patron of ACOMORAN. Informed consent was also obtained from each of the participants before administering the questionnaires.

### Sample size determination

The sample size was determined using the formula

$$N = \frac{z^2 p q}{d^2}$$

Where N=minimal sample required, Z=Standard normal deviate at 95%, Confidence interval = 1.96

P =34.3% (prevalence of substance use obtained from a previous study in Kano city conducted by the Community Medicine Department of the AKTH), (Kabir et al., 2004). q=Complementary probability to P=1 - P = 1- 0.34 = 0.66, d=precision of the study = 5% = 0.05.

$$n = \frac{(1.96)^2 (0.34 \times 0.66)}{(0.05)^2} = 338.$$

The sample size was 338. However, it was increased to 400 which was about 20% for greater precision.

### Sampling technique

The sampling technique adapted was multistage.

**Stage I** - Systematic probabilistic selection of 4 political wards from the 12 existing wards (Marhaba, Kasuwa, Dangi, and Bawo wards). At the time of the study there were 126 registered commercial motorcycle stands within Tarauni LGA, with 5040 registered members, and 14-66 members per stand.

**Stage II** – Systematic selection of 3 stands on each selected wards, bringing the total number of randomly selected stands to twelve.

**Stage III** – Whole population study of the commercial motorcyclists in each selected stand after being identified by their identity card of the association, until when the required sample size was achieved.

### Inclusion criteria

1. Age  $\geq$  18 years.
2. Registered membership of ACOMORAN in Tarauni LGA.
3. Consent to participate in the study.

### Exclusion criteria

1. Motorcyclists with a history of mental illness.
2. Absence from the stand during data collection after 3 return visits.

### Instrument for data collection

#### *Modules in schedules for clinical assessment in neuropsychiatry (SCAN), Alcohol and psychoactive substance use sections*

The Modules in Schedules for Clinical Assessment in Neuropsychiatry (SCAN) on use of Alcohol and use of psychoactive substances other than alcohol was adapted for the study (WHO, 1999). The SCAN system is a set of instrument and manuals aimed at assessing, measuring and classifying the psychopathology and behaviour associated with major psychiatric disorders of adult life. The SCAN text has three components: the tenth edition of the Present State Examination, the Item Group Checklist and the Clinical History Schedule.

In its complete form, the SCAN text is intended for use only by clinicians with an adequate knowledge of psychopathology who have taken a course at a WHO-designated SCAN training centre. The lead author had formal trainings in SCAN.

### Data analysis

Data analysis was done with the Statistical Package for the Social Sciences (SPSS), 17<sup>th</sup> edition. Simple descriptive data were presented with frequencies, proportions and percentages. Categorical (nominal) variables were compared with student  $\chi^2$ . Correlations between psychoactive substance use and road traffic violations and accidents were also explored using Spearman's correlation. All tests were two tailed, with p value <0.05 taken as significant.

## RESULTS

### Age distribution of the participants

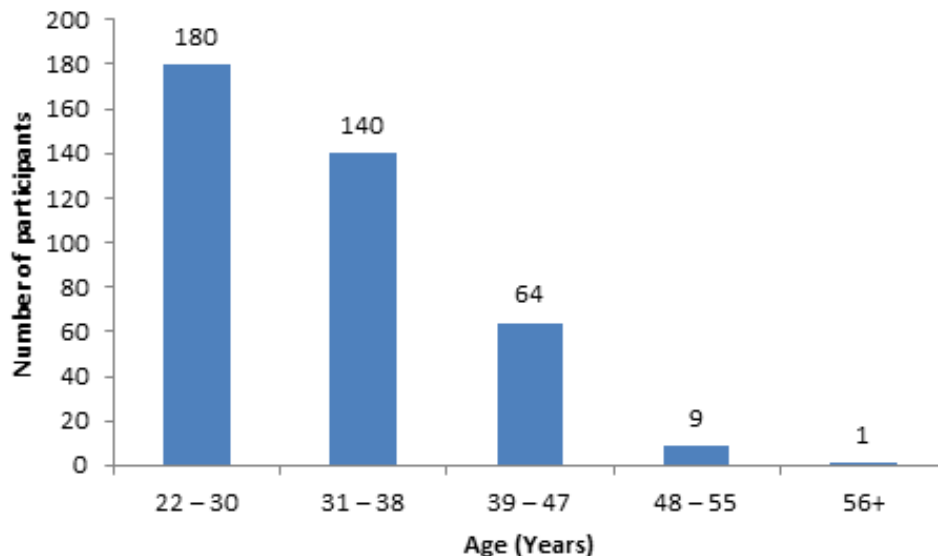
There were 394 participants, aged 22 to 60 years, with mean age of 32.7 years  $\pm$  6.6. The modal age group was 22 to 30 years (Figure 1).

### Gender distribution of the participants

All of the participants were males. The lifetime use of psychoactive substances is presented in Table 1. Tobacco had the highest prevalence with 76 respondents (19.3%), followed by stimulants with 47 respondents (11.9%). All of the participants who used psychoactive substances used tobacco. Most of the participants were on at least two substances. Participants did not report use of alcohol, heroin, cocaine and benzodiazepines.

Table 2 shows the relationship between road traffic accidents, road traffic violation and substance use. It shows that substance users were more likely to have road traffic accidents (P = 0.004; O.R = 2.6 (1.4-4.7) and road traffic violations (P < 0.001; O.R = 1.6 (0.8-3.1) than non-users.

Table 3 shows the spearman's correlation between substance use status, road traffic violation and accidents. Positive correlation was obtained between road traffic violations, road traffic accidents and substance use status at 99% confidence interval. Higher rates of road



**Figure 1.** Age distribution of the participants

**Table 1.** Prevalence of substance use among respondents (n = 394).

Substance	Number	Percent
Tobacco	76	19.3
Stimulants	47	11.9
Cannabis	15	3.8
Inhalant	8	2.0
Opiates	5	1.3

**Table 2.** Relationship between road traffic accidents, road traffic law violation and substance use (n = 394).

Variable	Drug use status		Statistics test		
	Users n (%)	Non users n (%)	$\chi^2$	p value	O.R (95% C.I)
<b>Road traffic accident</b>					
Yes	69 (89.6)	240 (75.7)			
No	8 (10.4)	77 (24.3)	7.08	0.004*	2.6 (1.4 – 4.7)
<b>Road traffic violation</b>					
Yes	66 (85.7)	190 (59.9)			
No	11 (14.3)	127 (40.1)	18.09	< 0.001*	1.6 (0.8 – 3.1)

\*= statistically significant.

**Table 3.** Correlation between substance use status and road traffic violations and accidents Spearman's correlation coefficient.

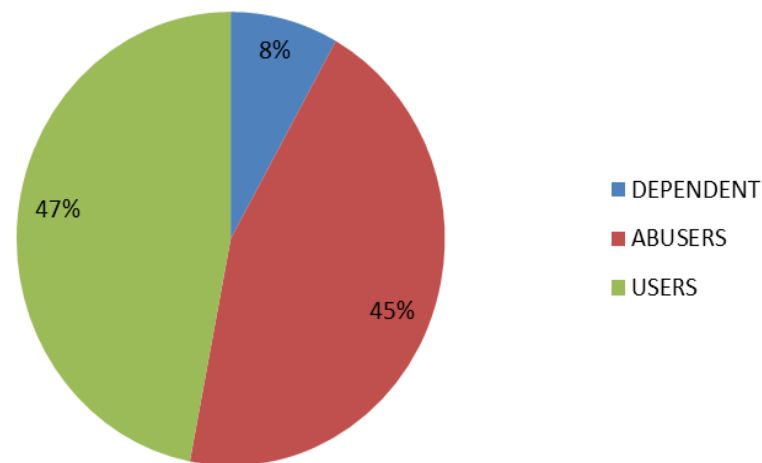
Variable	rho (ℓ)
Road traffic violation	0.157*
Road traffic accident	0.197*

\* = p<0.01.

**Table 4.** Relationship between specific substance use status and road traffic violations (n = 394).

Substance		Road traffic violations		$\chi^2$	P
		Yes	No		
Inhalants	Users	8 (100.0)	0 (0.0)	4.402	0.031*~
	Non-users	248 (64.2)	138 (35.8)		
Tobacco	Users	61 (80.3)	15 (19.7)	9.671	0.002*
	Non-users	195 (61.3)	123 (38.7)		
Cannabis	Users	15 (100.0)	0 (0.0)	8.406	0.004*
	Non-users	241 (63.6)	138 (36.4)		
Opiates	Users	5 (100.0)	0 (0.0)	2.730	0.114~
	Non-users	251 (64.5)	138 (35.5)		
Stimulants	Users	43 (91.5)	4 (8.5)	16.486	<0.001*
	Non-users	213 (61.4)	134 (38.6)		

\*= Statistically significant ( $p < 0.05$ ), ~ = Fisher's p value.

**Figure 2.** SCAN substance diagnosis of the study participants

traffic violations were observed among motorcycle operators who used inhalants ( $X^2 = 4.402$ ,  $p = 0.031$ ), tobacco ( $X^2 = 9.671$ ,  $p = 0.002$ ), cannabis ( $X^2 = 8.406$ ,  $p = 0.004$ ), and stimulants ( $X^2 = 16.486$ ,  $p < 0.001$ ), compared to those who did not use them (Table 4).

Highest rate of accident was reported among tobacco users (84.2%) followed by users of inhalants, while lowest accident rate was found among users of stimulants (17.0%). The rate of accident among cannabis users was 46.7%. None of the five users of opiates had accident. Road traffic accident was commoner among participants who did not use cannabis ( $X^2 = 9.296$ ,  $p = 0.006$ ), and those who did not use opiates ( $X^2 = 18.410$ ,  $p < 0.001$ ) compared to those who use the substances (Table 5).

### Distribution of participants by SCAN substance diagnoses

Figure 2 shows the distribution of the participants by SCAN substance diagnoses. In all, 8% of the respondents met the criteria for SCAN substance dependence diagnosis, while 45% had a diagnosis of substance abuse using SCAN.

### DISCUSSION

The psychoactive substance users had significantly more violations of road traffic regulations compared to those who did not use drugs. Similarly, users of psychoactive



**Table 5.** Relationship between specific substance use status and road traffic accidents (n = 394).

	Substance	Road traffic accident		$\chi^2$	P
		Yes	No		
Inhalants	Users	5 (62.5)	3 (37.5)	1.224	0.378
	Non-users	304 (78.8)	82 (21.2)		
Tobacco	Users	64 (84.2)	12 (15.8)	1.862	0.172
	Non-users	245 (77.0)	73 (23.0)		
Cannabis	Users	7 (46.7)	8 (53.3)	9.296	0.006*
	Non-users	302 (79.7)	77 (20.3)		
Opiates	Users	0 (0.0)	5 (100.0)	18.410	<0.001*
	Non-users	309 (79.4)	80 (20.6)		
Stimulants	Users	8 (17.0)	39 (83.0)	0.654	0.419
	Non-users	77 (22.2)	270 (77.8)		

\* = Statistically significant ( $p < 0.05$ ); Fisher's p value.

substances had significantly more road traffic accidents than the non-drug users. It has been shown that using drugs was relatively prevalent among injured motorcyclists, which served as a predisposing factor in accidents (Adogu, 2009). Our finding is in line with previous studies among motorcyclists which reported that the use of psychoactive substances was associated with the occurrence of road traffic accidents (Crilly, 1998; Marks, 1982; Alti-Muazu and Aliyu, 2008).

In this study, the rate of road traffic accidents among substance users was 89.6%. Similarly, 22.3% of road traffic accidents were found to be associated with psychoactive substance use. This was a little higher than the result from a study done in Iran to determine addiction role in motorcycle accidents which found that out of 400 motorcyclists that had accidents, 17.3% had a history of drug use (Araghi and Vahedian, 2007). On the other hand, it was much lower than what was found in a study on prevalence of psychoactive substance use among commercial motorcyclists in Zaria, north western Nigeria, which reported a prevalence of 59.5% accident rate (Alti-Muazu and Aliyu, 2008). However, the Zaria study did not use standard instrument for diagnosis and assessment of substance use.

Road traffic violations and accidents were associated with use of inhalants, tobacco, cannabis and stimulants. This agrees with previous studies that linked use of these psychoactive substances with road traffic accidents among motorcycle operators (Gadegbeku et al., 2011; Drummer et al., 2003; Iribhogbe and Odai, 2009). It has been found that behavioural and cognitive skills related to driving performance were impaired in a dose dependent fashion with increased cannabinoids blood levels

(Berghaus et al., 1995).

Substance dependence and substance abuse were the only SCAN diagnoses made in the respondents. Many of the subjects who met dependence diagnosis had increased desire to consume the substance, time wastage in using the substance and increased use of the substance to achieve the desired effect. The subjects did not meet the criteria for other SCAN diagnoses.

This study has some limitations. We could not establish a causal relationship between the psychoactive substances, road traffic accidents and violations due to the study design. Similarly, it is possible that some of the road traffic accidents and violations were due to other factors, like operator competence which we did not explore in this study. In addition, the study was limited to registered commercial motorcycle operators and may not be generalized to entire commercial motorcycle operators. Future studies should explore these limitations and improve on our findings.

## Conclusion

This study has shown that psychoactive substance use is associated with road traffic violations and accident among commercial motorcycle operators. Clinicians attending to motorcycle operators involved in road traffic accidents should be alert to the possibility of psychoactive substance use among them, and where required interventional measures should be instituted early. There is need for more epidemiological studies, especially community based, covering wider areas, involving various medical specialties, psychologists, sociologists, so as to

have a more comprehensive picture of psychoactive substance use problems among different population groups, especially commercial motorcycle operators.

### Conflict of Interests

The authors have not declared any conflict of interests.

### ACKNOWLEDGEMENTS

Authors wish to acknowledge the registered motorcycle operators under ACOMORAN for their time. We also wish to acknowledge AKTH management for providing support and permission for this research. We also thank Prof's Richard Uwakwe and Owodoiho Udofia for their efforts towards the success of this research.

### REFERENCES

- Adogu POU, Illika AL, Asuzu AL (2009). Predictors of Road Traffic Accidents, Road Traffic Injury and death among commercial motorcyclists in an Urban Area of Nigeria. *Nigerian J. Med.* 18(4):393-397.
- Alti-Muazu Aliyu AA (2008). Prevalence of psychoactive substance use among commercial motorcyclists and its health and social consequences in Zaria, Nigeria. *Ann. Afr. Med.* 7:67-71.
- Araghi E, Vahedian M (2007). Role of Addiction in Motorcycle Accidents in Iranian province. *J. Nurs. Midwifery* 17(58):34-39
- Berghaus G, Sheer N, Schmidt P (1995). Effects of cannabis on psychomotor skills and driving performance: A metaanalysis of experimental studies. *Proceedings of the 13th International conference on alcohol, drugs and traffic safety, Adelaide, Australia.*
- Chalya PL, Mabula JB, Ngayomela IH, Kanumba ES, Chandika AB (2010). Motorcycle injuries as an emerging public health problem in Mwanza city, north western Tanzania. *East Central Afr. J. surgery* 6(2):35-44.
- Crilly M (1998). Contributory factors to traffic accident deaths identified at corners inquest. *J. Public Health Med.* 20:139-143.
- Drummer OH, Gerostamoulos J, Batziris H (2003). The incidence of drugs in drivers killer in Australian road traffic crashes. *Forensic Sci. Int.* 134:154-162.
- Gadegbeku B, Amoros E, Lauman B (2011). Responsibility study: Main illicit psychoactive substances among car drivers involved in fatal road crashes. 55<sup>th</sup> AAAM Annual conference. *Ann. Adv. Automotive Med.* 55:293-300.
- Iribhogbe PE, Odai ED (2009). Driver related risk factors in commercial motorcycle (Okada) crashes in Benin city Nigeria: Brief report. *Prehospital Disaster Med.* 24(4):356-359.
- Lasebikan VO, Baiyewu O (2009). Profile of problems associated with psychoactive substance use among long distance commercial automobile drivers in Ibadan, Nigeria. *J. Psychiatr.* 7(2):7-16.
- Lasebikan VO (2010). Is cannabis use related to road crashes? A study of Long distance commercial drivers in Nigeria. *Afr. J. Drug Alcohol Stud.* 9(1):23-32.
- Makanjuola BA, Oyeleke SA, Akande TM (2007). Psychoactive substance use among Long distance vehicle drivers in Ilorin, Nigeria. *Nigerian J. Psychiatr.* 5(1):14-18.
- Marks V (1982). Drugs and driving. *J. soc. health* 102:205-210.
- National highway traffic safety administration (2007). National roadside survey of alcohol and drug use by drivers. U.S. Department of transportation, Washington, D.C.
- Nzegwu MA, Banjo AAF, Akhiwu W, Ahigbe JU, Nzwgwu CO (2008). Morbidity and mortality among road users in Benincity, Nigeria. *Ann. Afr. Med.* 7(3):102-106.
- Ozdemir C, Ozel ET, Dogan YB (2005). Investigation of Alcohol Use disorders in a group of driving-while-intoxicated offenders. *Ann. Emerg. Med.* 40(6):529-536.
- Sabey BE, Stoughton GC (1980). The drinking road user in Great Britain. Transport and Road Research Laboratory, Supplementary Report, 616. Crowthorne: TRL Limited.
- Substance abuse and mental health services administration, (2009). National survey on drug use and health. Office of applied studies.
- Suleiman GT, Adeyemi SO, Adeponle AB (2006). An Overview of Psychoactive substance use and misuse in Northern Nigeria. *Nigerian J. Psychiatr.* 4(1):9-19.
- United Nations Office of Drug and Crime, (2007). World Drug Report.
- World Health Organisation (1999). Assessment, Classification and Epidemiology, Geneva.

# International Journal of Medicine and Medical Sciences

## Related Journals Published by Academic Journals

- *Journal of Medicinal Plant Research*
- *African Journal of Pharmacy and Pharmacology*
- *Journal of Dentistry and Oral Hygiene*
- *International Journal of Nursing and Midwifery*
- *Journal of Parasitology and Vector Biology*
- *Journal of Pharmacognosy and Phytotherapy*
- *Journal of Toxicology and Environmental Health Sciences*

**academicJournals**