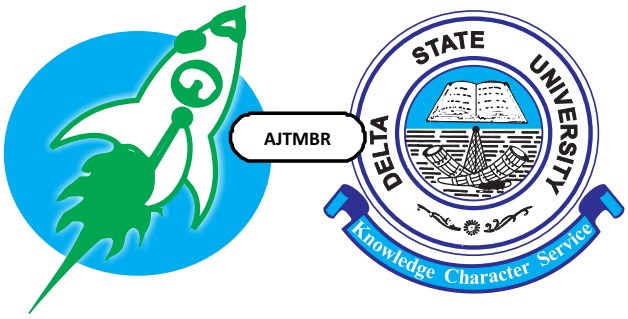
African Journal of Tropical Medicine and Biomedical Research (AJTMBR)



The Journal is the Official Publication of the College of Health Sciences, Delta State University, Abraka, Nigeria.

ISSN: 2141-6397

Vol. 6, No. 1, July 2023

Focus and Scope

The African Journal of Tropical Medicine and Biomedical Research is a multidisciplinary and international journal published by the College of Health Sciences, Delta State University of Abraka, Nigeria. It provides a forum for Authors working in Africa to share their research findings on all aspects of Tropical Medicine and Biomedical Sciences and to disseminate innovative, relevant and useful information on tropical medicine and biomedical sciences throughout the continent. The journal will publish original research articles, reviews, editorials, commentaries, short reports, case reports and letters to the editor. Articles are welcome in all branches of medicine and dentistry including basic sciences (Anatomy, Biochemistry, Physiology, Pharmacology, Psychology, Nursing etc) and clinical sciences (Internal Medicine, Surgery, Obstetrics and Gynaecology, Dental surgery, Child Health, Laboratory Sciences, Radiology, Community Medicine, etc). Articles are also welcome from social science researchers that document the intermediating and background social factors influencing health in countries of Africa. Priority will be given to publication of articles that describe the application of the principles of primary health care in the prevention and treatment of diseases.

Editorial Notices

The journal will be published biannually in the months of March and September. Annual subscription fee in Nigeria is two thousand naira (N2,000) per volume (2issues); One-thousand-naira single copy (N1000). The annual subscription rate for other parts of the world is as follows: United Kingdom £60 (post free). West Africa $60 (post free). The rest of the World and the United States of America $120 (post free). A charge of $60 is made for reprints inclusive of postage. Cheques should made payable to the African Journal of Tropical Medicine and Biomedical Research and addressed to the Editor-in-Chief.

Journal Contact

All correspondence, including manuscripts for publication (in triplicate) should be addressed to:

Professor P.S. Igbigbi
The Editor-in-Chief,
Department of Anatomy,
Faculty of Basic Medical Sciences,
College of Health Sciences,
Delta State University, Abraka,
Delta State, Nigeria.

Or:
Professor Lawrence Omo-Aghoja
Editor
Department of Obstetrics and Gynecology,
Faculty of Clinical Medicine,
Delta State University, Abraka, Nigeria.
Email: journalajtmbr@yahoo.com
Cc: all email to
eguono_2000@yahoo.com
Tel: 08039377043

All authors are advised to submit an electronic copy in CD-ROM along with a hard copy of their manuscript, as this will spare remarkable time in the reviewing and typesetting processes.

In the alternative, authors can submit their articles and covering letter by email attachments. A covering letter (signed by all authors) accompanying the manuscript should certify that the article has not been previously published and is not being considered for publication elsewhere.

Information for Authors

All manuscript are peer-reviewed and accepted with the understanding that the work has not been published or being considered for publication elsewhere. Indeed, the authors would be requested

to sign a copyright form transferring the ownership of the paper to the African Journal of Tropical Medicine and Biomedical Research. All articles must include the correct names and addresses of author(s) including e-mail addresses and telephone numbers. Articles will be subjected to a thorough peer review process before any decision is made to publish or not. Authors should note that the African Journal of Tropical Medicine and Biomedical Research is not under any obligation to publish articles submitted, as decision to publish will be based on recommendations of reviewers and the editorial advisory board.

Manuscripts

Articles submitted for publication should be typed double-spaced with 2.5cm margins with accompanying CD-ROM in Microsoft Word format for easy and quick peer review and typesetting. Each of the following sections should begin in a new page: title page, abstract, introduction, materials and methods, results, discussion, acknowledgment (s), references, tables, legends to figures and illustrations. The manuscript should include:

Title Page

The title page should include the following information: 1. the title and sub-title; 2. the name(s) of the author(s); 3. the affiliation(s) of the author(s); 4. name and address of the corresponding author and 5. three to six key words for indexing and retrieval purposes.

Abstract

The abstract should be structured and not more than 250 words. It should carry the following headings: Introduction, Materials and Methods, Results and Conclusion.

Original Research- The journal welcomes articles reporting on original research, including both quantitative and qualitative studies. Full-length articles should generally not exceed 3000 words, excluding abstract, tables, figures, and references. The subject matter should be organised under appropriate headings and sub-headings as itemized above.

Review Articles- Comprehensive review articles on all aspects of tropical medicine and biomedical sciences will also be considered for publication in the journal. Reviews should provide a thorough overview of the topic and should incorporate the most current research. The length of review articles must not exceed 3,000 words and the organisational headings and sub-headings used are at the author's discretion.

Short Reports - Brief descriptions of preliminary research findings or interesting case studies will be considered for publication as short reports. The length of the abstract and article should be restricted to 150 and 2,000 words respectively and organisation of short reports are left to the author's discretion.

Commentaries or Editorials- Commentaries or editorials on any aspect of tropical medicine and biomedical sciences in Africa will be considered for publication in the journal. Opinion pieces need not reference previous research, but rather reflect the opinions of the author(s). The length should not exceed 2,000 words.

Tables and Figures

All tables and figures should be submitted on separate sheets of paper and should be clearly labelled. Coloured tables and figures may be reprinted in black and white. Authors should especially take care that all tables are clear and understandable by themselves, independent of

the text. A reader should be able to read only the tables and easily grasp all information without the text.

Acknowledgments

Acknowledgments should be included on a separate sheet of paper and should not exceed 100words. Funding sources should be noted here.

References

References should be in the Vancouver style and numbered consecutively in the order in which they are mentioned in the text. Titles of journals should be abbreviated according to the Index Medicus style. Authors must cross-check and make sure that all information provided in the reference list is complete and correctly written. Reference numbers should be inserted above the line on each occasion a reference is cited in the text, e.g., … as 1-3 reported in other studies. Numbered references should appear at the end of the article and should include the names and initials of all authors. The format of references should be as published by the International Committee of Medical Journal Editors in the British Medical Journal 1988, volume 296, pages 401-405. The following are sample references for an article published in a journal and for a book: Ahmed Y, Mwaba P, Chintu C, Grange JM, Ustianowski A, Zumla A. A study of maternal mortality at the University Teaching Hospital, Lusaka, Zambia: the emergence of tuberculosis as a major non-obstetric cause of maternal death. Int J Tuberc Lung Dis 1999; 3: 675-680. Whitby LG, Smith AF, Beckett GJ. Enzyme Tests in Diagnosis. In: Lecture Notes on Clinical Chemistry. Whitby LG, Smith AF & Beckett GJth (eds). 4 editions. Blackwell Scientific Publications. 1988. 103-127.

Units of Measurement

All measurements should be expressed in SI (Systeme International) Units.

Galley proofs

Corrections of galley proofs should be strictly restricted to Printer's error only. Orders for offprints should be made when the corrected proofs are being returned by the authors. Articles accepted for publication remain the property of the journal and can only be reproduced elsewhere in line with section 5 of the copyright agreement.

Table of Contents

Effect of Occupational exposure to Gasoline on Reproductive and Thyroid hormones among male Petrol station attendants in Kwara State *6-11*

Adunmo Godwin O.; Seyi Taiwo; Ibrahim Muniru; Busari, A. O.

Production of L-lysine under submerged fermentation by *Corynebacterium glutamicum* using different agricultural plants leaves *12-24*

Theresa Ezedom, Egoamaka Oliseneku Egbune, Solomon Adanoritsewo Atseponu, Mary Ogochukwu Charles, Blessed Achugbue Benson, Diana Ebbah, Promise Chika Amechi, Oghenetega Benjamin, Akpevweoghene Rejoice Egbodje, Lucky Ebinum, Blessing Ifechi Chukwudozie, Stephen Eboe, Ifeanyi Benedict Alexander, Sophia Fejiro Edijana and Nyerhovwo Tonukari

Use of Cognitive Enhancers among students of Nigerian Tertiary Institutions *25-35*

Uchendu Adaeze Phina, Uchendu Obiora Jude

Prevalence of gestational diabetes mellitus, fetal and maternal outcomes of parturients with risk factors versus parturients without risk factors for gestational diabetes mellitus: A preliminary analysis of the comparative study of blood sugar levels at a tertiary hospital in southern Nigeria *36-47*

Omo-Aghoja LO, Onohwakpor EA, Adeyinka AT, Asaboro N, Oyeye Lucky

Comparative assessment of renal volume and doppler velocimetric indices among subjects with sickle cell disease and controls in Benin, Nigeria *48-63*

Jeffrey Imuetinyan Imade, Festus Oghanina Ehigiamusoe, Adenike O. Akhigbe,

Use of Cognitive Enhancers among students of Nigerian Tertiary Institutions

Uchendu Adaeze Phina[a], Uchendu Obiora Jude[b]

ABSTRACT

Introduction: Nonmedical use of pharmaceutical cognitive enhancers PCE in Universities has been documented in several studies. However, there is paucity of research on this subject among Nigerian University students. This survey hopes to investigate the awareness, use and effect of PCE among undergraduate medical students of a Nigerian University.

Materials and method: The study utilized self-administered questionnaire on the awareness and usage of PCE with respondents composed of 327 medical students at Delta State University, Nigeria.

Results: The respondents have a male to female ratio of 1:0.85 with 99.1% being single. Those living on campus, off campus, family home and dual accommodation, accounted for 65.4%, 30.6%, 2.8% and 0.3% of the participants. In total, 81.7% of the participants are aware of PCE usage for academic purpose. Overall, 40.1% of the respondents reported using one or more of the PCE during the period considered. Caffeinated drinks and beverages, energy drinks, cigarette, marijuana, and Ginseng were used by 82.5%, 50.4%, 3.1%, 1.5% and 1.5% of the users respectively. The motivation for using both caffeinate beverages and energy drinks are for increased study time, concentration and alertness. The more frequent periods of use are during examination period and personal study time. Most of these PCE are self-purchased and choice of usage are mainly influenced by friends. Both set of users reported insomnia, headache, palpitation, dizziness and fatigue as undesirable experience. Among the respondents, 45% are interested in using PCE if there are no undesirable effects; 30% rejected such, while the rest are indifferent.

Conclusion: Our survey showed significant association between the age, male gender and academic level and the usage of PCE. Our respondents used mainly caffeinated beverages and energy drink. Their choice of PCE is strongly influenced by peer pressure and the motivations are mainly to boost studying time, concentration and alertness.

Keywords: Pharmacological cognitive enhancers, Medical students, Caffeine, Nigeria,

a.Department of Pharmacology and Toxicology, University of Benin, Benin City, Nigeria
b.Department of Morbid Anatomy, Delta State University, Abraka, Nigeria.

***Corresponding author:** Dr. Uchendu Adaeze Phina, Department of Pharmacology, University of Benin, Benin City, Nigeria. E-mail: adaeze.uchendu@uniben.edu Phone :080320652

INTRODUCTION

Pharmacological cognitive enhancement is defined as "amplification or extension of core capacity of the mind by improving the internal and external information processing systems by using drugs or substances".[1] Many of such substances were primarily used to treat neuropsychiatric conditions that are often associated by cognitive deficit.[2] These pharmacological cognitive enhancers (PCE) are also taken by healthy individuals to boost energy, and to improve mental alertness, concentration and memory, despite the drawback of its use such as development of dependence and psychiatric disorders.[2,3,4]

These PCE are broadly classified into prescription and non-prescription drugs or substances. Prescription PCE include methylphenidate, modafinil, piracetam and amphetamine salt mixture; and many other drugs which have not been approved for human use.[5,6] The non-prescription PCE include caffeine and caffeine containing beverages, vinpocetine, cobalamine (vitamin B12), guarana and pyridoxine (vitamine B6).[5]

Their mode of action have not been fully elucidated. However, most of them, including modafinil, amphetamine salt and methylphenidate are central nervous system stimulants.[7]

There is a rising interest on use of PCE in university setting among researchers. In United Kingdom (UK), among 1614 student respondents, 33% of them have used off-label prescription PCE.[8] In another study, involving 877 students from Irish and UK Universities, lifetime incidence of use of amphetamine, methylphenidate and modafinil was 2%, 5.9% and 6.2% respectively.[9] Report from United States (US), showed that misuse of PCE among university students was up to 17%.[10]

Scientific data regarding the use of PCE among Nigerian University students is scanty.

This study was performed in Delta State University and is hoped to unveil the pattern of PCE usage among medical students, including relationship with age, gender, academic level and place of residence. We hope that results from this study will guide policy makers as well as add to already existing literature.

MATERIALS AND METHOD

The sample comprises of the medical students of Delta State University (DELSU) during the study period. The participants were asked to complete a self-administered questionnaire about awareness and usage of PCE in their academic environment. The study was conducted from 4th to 16th June 2023 in line with the ethical standard of the institution. Filling of the questionnaire was voluntary, and the participants were assured of anonymity and confidentiality of information provided. Before participating in the study, the framework of the study was explained to the participants. Informed consent was obtained from all participants and the right to withdraw from participation at any time during the survey was reserved.

Demographic information was limited to age, sex, academic year, marital status and nature of residence of the respondents. A 10-item questionnaire was used for this survey to assess: 1) respondents' awareness of the use of PCE; 2) the usage of PCE among participants; 3) reasons for usage of PCE; 4) positive effects of PCE on participants; 5) time of usage of PCE; 6) duration of usage of PCE; 7) source of acquisition of PCE; 8) source of information on the PCE; 9) Undesirable effects during usage of PCE; and 10) their readiness to use PCE if they are assured of minimal side effects and safety.

All the data were analyzed using SPSS for windows, version 24.0 (SPSS Inc, Chicago, II, USA) and results were summarized using tables and figures. Finding was regarded as statistically significant using $p<0.05$.

The study was approved by the Research and Ethics Committee in the Faculty of Basic Clinical Sciences, Delta State University, with approval number FBCS/REC/23/01. The authors also secured permission and approval for data collection from the provost, College of Health Sciences, Delta State University.

RESULTS

In total, 327 completed questionnaires were retrieved, which is equivalent to 90% of the expected participants in the study, with a male to female ratio of 1: 0.85. Of all the respondents, ninety-nine-point one percent of them are married. Those living on campus, off campus, family home and dual accommodation, accounted for 65.4%, 30.6%, 2.8% and 0.3% of the respondents. The detail of the socio-demographic profile is shown in Table I.

The awareness of PCE by respondents is shown in Figure I. In total, 81.7% of the respondents are aware of the use of PCE in the university setting. Amongst them, 68.2%, 45.3%, 20.8%, 13.1%, and 5.5% are aware of use of caffeinated beverages, energy drinks, tramadol, marijuana, and kola nut as PCE. There is a significant association between age and academic level and awareness of PCE (as is depicted in Table II).

The usage of PCE is shown in Figure II. Overall, 40.1% of the respondents reported using one or more of the PCE during the period considered. Caffeinated beverages, energy drinks, cigarette, marijuana, and ginseng were used by 82.5%, 50.4%, 3.1%, 1.5% and 1.5% 2 of the respondents that admitted using PCE respectively. There is also significant association between age, gender and academic level and usage of PCE as is depicted in Table III. Details of impact of use of energy drink and caffeinated beverage is shown in Table IV.

The motivation for using these drugs, in order of frequency are increased study time, concentration and alertness. The more frequent periods of use are during examination period and personal study time. Most of the PCE are self-purchased and the choice of PCE are mainly influenced by friends. Both sets of users reported insomnia, headache, palpitation, dizziness and fatigue as undesirable side effects.

Among the respondents, 45% agreed that they will use PCE if they are guaranteed of its safety, 30% disagreed to its usage while the rest are indifferent.

Table I: Demographic characteristics of respondents (N=327)

Demographic Parameters	Frequency	Percentage (%)
Age (Years)		
16 – 20	154	47.1
21 – 25	142	43.4
26 – 30	28	8.6
>30	3	0.9
Gender		
Male	177	54.1
Female	150	45.9
Academic Level		
100	57	17.4
200	77	23.5
300	54	16.5
400	39	11.9
500	64	19.6
600	36	11.0
Marital Status		
Single	324	99.1
Married	3	0.9
Residence		
On Campus	214	65.4
Off Campus	100	30.6
Individual home	9	2.8
Family home	3	0.9
Dual accommodation	1	0.3

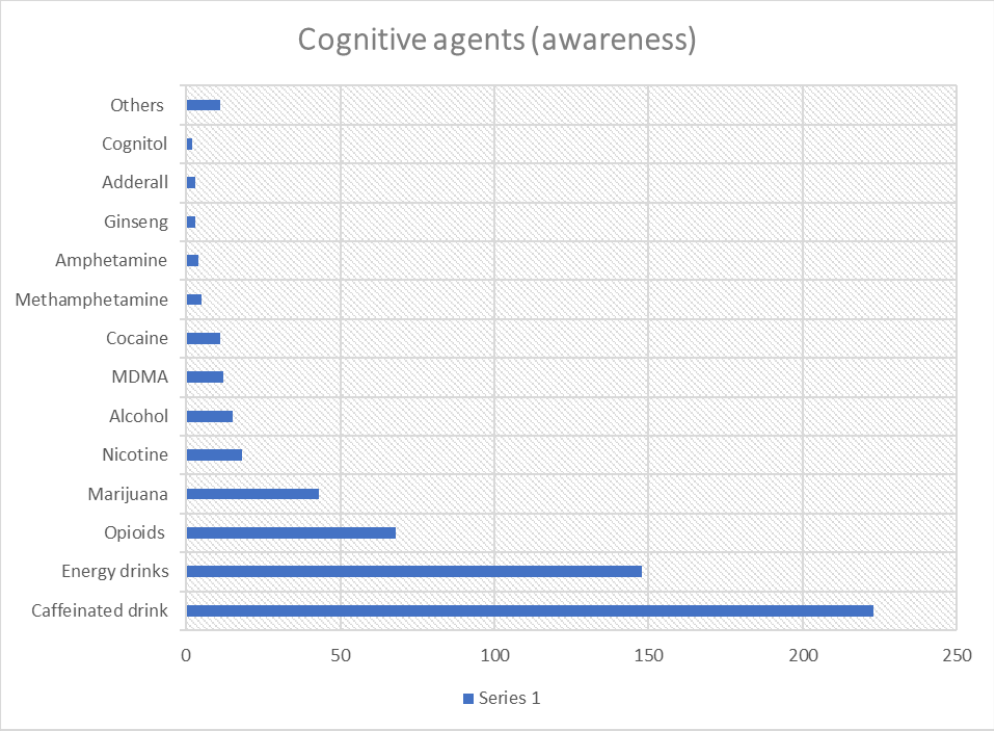


Figure 1: Awareness of the use of PCEs among medical students

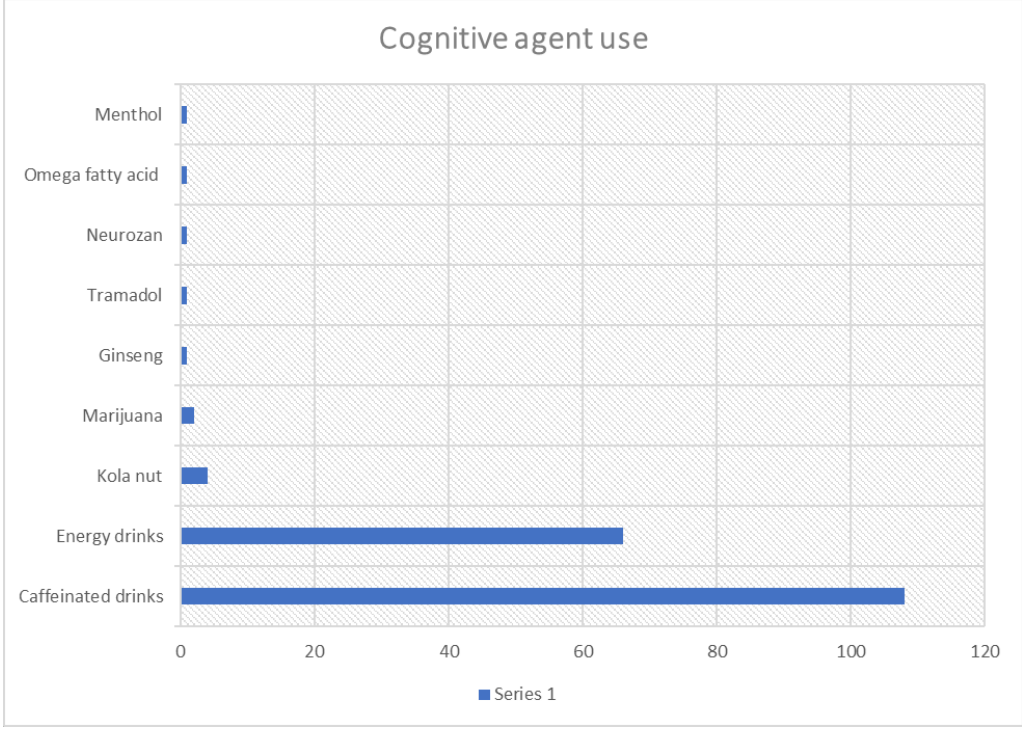


Figure II: The use of PCEs among medical students

Table II. The distribution of students' awareness of PCEs by their demographic features

	Awareness of PCEs			X^2	P value
	Yes	No	Total		
Age (Year)					
16 – 20	116 (43.4%)	38 (63.3%)	154 (47.1%)	0.727	0.033
21 – 25	125 (46.8%)	17 (28.3%)	142 (43.4%)		
26 – 30	24 (9.0%)	4 (6.7%)	28 (8.6%)		
>30	2 (0.7%)	1 (1.7%)	3 (0.9%)		
Sex					
Male	143 (53.6%)	34 (56.7%)	177 (54.1%)	0.191	0.662
Female	124 (46.4%)	26 (43.3%)	150 (45.9%)		
Academic Level					
100	36 (13.5%)	21 (35.0%)	57 (17.4%)	30.938	0.000
200	57 (21.3%)	20 (16.7%)	77 (23.5%)		
300	44 (16.5%)	10 (16.7%)	54 (16.5%)		
400	38 (14.2%)	1 (1.7%)	39 (11.9%)		
500	61 (22.8%)	3 (5.0%)	64 (19.6%)		
600	31 (11.6%)	5 (8.3%)	36 (11.0%)		
Marital Status					
Single	265 (99.3%)	59 (98.3%)	324 (99.1%)	0.454	0.501
Married	2 (0.7%)	1 (1.7%)	3 (0.9%)		
Residence					
On Campus	183 (68.5%)	31 (51.7%)	214 (65.4%)	6.803	0.147
Off Campus	74 (27.7%)	26 (43.3%)	100 (30.6%)		
Individual home	7 (2.6%)	2 (3.3%)	6 (2.8%)		
Family home	2 (0.7%)	1 (1.7%)	3 (0.9%)		
Dual accommodation	1 (0.8%)	0 (0.0%)	1 (0.3%)		

Table III. The distribution of students' use of PCE by their demographic features

	Use of PCEs				
	Yes	**No**	**Total**	**X^2**	**P value**
Age (Year)					
16 – 20	44 (33.6%)	110 (56.1%)	154 (47.1%)	16.969	0.001
21 – 25	70 (53.45%)	72 (36.7%)	142 (43.4%)		
26 – 30	16 (12.2%)	12 (6.1%)	28 (8.6%)		
>30	1 (0.8%)	2 (1.0%)	3 (0.9%)		
Sex					
Male	83 (63.4%)	94 (48.0%)	177 (54.1%)	7.499	0.006
Female	48 (36.6%)	102 (52.0%)	150 (45.9%)		
Academic Level					
100	16 (12.2%)	41 (20.9%)	57 (17.4%)	44.887	0.000
200	20 (15.3%)	57 (29.1%)	77 (23.5%)		
300	11 (8.4%)	43 (21.9%)	54 (16.5%)		
400	24 (18.3%)	15 (7.7%)	39 (11.9%)		
500	42 (32.1%)	22 (11.2%)	64 (19.6%)		
600	18 (13.7%)	18 (9.2%)	36 (11.0%)		
Marital Status					
Single	130 (99.2%)	194 (99.0%)	324 (99.1%)	0.057	0.811
Married	1 (0.8%)	2 (1.0%)	3 (0.9%)		
Residence					
On Campus	90 (68.7%)	124 (63.3%)	214 (65.4%)	3.046	0.550
Off Campus	35 (26.7%)	65 (33.2%)	100 (30.6%)		
Individual home	4 (3.1%)	5 (2.6%)	9 (2.8%)		
Family home	1 (0.8%)	2 (1.0%)	3 (0.8%)		
Dual accommodation	1 (0.8%)	0 (0.0%)	1 (0.3%)		

Table IV. Impact of specific PCE

Descriptions	Energy drink	Caffeine
Reasons for use		
Concentration	13 (20.6%)	24 (19.5%)
Increased study time	49 (77.8%)	74 (60.2%)
Improve academic performance	9 (14.3%)	14 (11.4%)
Relaxation	1 (1.6%)	1 (0.8%)
Effect		
Positive	34 (54.0%)	49 (39.8%)
Negative	8 (12.7%)	16 (13.0%)
Indifferent	21 (33.3%)	58 (47.2%)
Time of use		
Daily	1 (1.6%)	7 (5.7%)
Study period	27 (42.9%)	44 (35.8%)
Exams	34 (54.0%)	48 (39.0%)
Duration of use (months)		
1	9 (14.3%)	14 (11.4%)
1 – 6	9 (14.3%)	11 (8.9%)
6 – 12	5 (7.9%)	5 (4.1%)
13 – 24	11 (17.5%)	11 (8.9%)
>24	14 (22.2%)	27 (22.0%)
Source of acquisition		
Friends	6 (9.5%)	10 (8.1%)
Self-purchased	27 (43.9%)	38 (30.9%)
Prescribed	4 (6.3%)	4 (3.3%)
Others	11 (17.5%)	8 (6.5%)
Cost		
Very expensive		1 (0.8%)
Expensive	1 (1.6%)	4 (3.3%)
Fair	22 (34.9%)	27 (22.0%)
Cheap	30 (84.1%)	53 (43.1%)
How do you learn about them		
Social media	4 (6.3%)	10 (8.1%)
Internet	4 (6.3%)	8 (6.5%)
Friends	37 (58.7%)	43 (35.0%)
Others	5 (7.9%)	16 (13.0%)
Side effects		
Insomnia	8 (12.7%)	16 (13.0%)
Headache	7 (11.1%)	11 (8.9%)
Palpitation	5 (7.9%)	6 (4.9%)
Dizziness	3 (4.8%)	5 (4.1%)
Fatigue	3 (4.8%)	3 (2.4%)
Chest pain	1 (1.6%)	1 (0.8%)
Sweating	1 (1.6%)	
Abdominal pain	1 (1.6%)	1 (0.8%)
Willingness to buy in the future		
Yes	32 (50.8%)	45 (36.6%)
No	9 (14.3%)	19 (15.4%)
Indifferent	22 (34.9%)	59 (48.0%)

DISCUSSION

The usage of PCE in University environment in Nigeria has not been examined scientifically. This survey therefore provides first-hand epidemiological data on this subject in this part of the globe.[8] The choice of medical students among other University students is in consideration of the relatively higher workload and competitiveness of the course. These medical students may therefore be motivated to use any available means, including use of PCE to ensure better grades.

Our survey showed that usage of prescription PCE for non-medical reasons in our academic setting is relatively uncommon. This is contrary to reports from western countries, where the lifetime prevalence of use of modafinil, methylphenidate and amphetamine among university students is within the range of 2% to 43%.[5] This epidemiological difference may be attributed to fear of undesirable effects and unavailability of such prescription drugs. This is however a welcome development, considering the risk of psychiatric problems that may arise from use of these drugs.[2,4]

The most used non-prescription PCE in our study is caffeinated beverages and energy drinks. This concurs with global view as caffeine remains the most consumed stimulant across the globe which are mainly in form of coffee or energy drink.[11] This is likely because they are freely accessible, quite affordable, does not require doctor's prescription before it can be purchased. They have also been known for ages for its use for memory and concentration enhancement. This raises concern of associated health hazards, which includes addiction, anxiety, mood disorder, panic attack, sleeping disorder and cardiovascular problems.[12]

We observed a significant correlation between male gender and the use of these PCE.

This is consistent with earlier reports.[13-17] This may be attributed to gender difference in perception of risk, differences in attitude towards substance and drug use and the social stigma associated with drug and substance use among females.

Our survey showed that increased duration of studying, concentration and improved alertness were the most frequently cited reasons for taking PCE. Other reports also concurred with our observation.[18-22] Unexpectedly, report from Lengvenyte et al., showed no relationship between grade point average (GPA) and use of PCE among university students.[23] Some studies have even shown that some students that engaged in PCE even had a lower GPA relative to those that abstained from them.[24-26] There is therefore need to discourage this trend and explore non-pharmacological approaches using nutrition, physical exercise, sleep, meditation, mnemonic strategies, computer training, and brain stimulation.[27]

Our study showed that major influence or source of information is from friends, showing that most decisions on use of PCE are strongly influenced by peer-pressure. This peer pressure relationship has earlier been demonstrated by Carroll and collegues.[28] Our study showed that most of the PCE used by respondents are self-purchased. This is at variance with report from western countries where most PCE are purchased through online sales.[29-31] It may however be explained by the choice of PCE in the study environment which are mainly caffeinated products that are readily available and affordable.

The survey also observed that PCE usage among senior medical students is more than usage among junior medical school. This view is supported by earlier report and may be related to addictive

effect as well as relatively higher workload with higher academic levels.[32]

Going forward from here, there is need to build a system that reduces peer pressure among students and explore non-pharmacological methods of cognitive enhancement.

There is also need to run campaign in universities that will build students' confidence, so that they can believe more in themselves without depending on PCE.

In conclusion, our survey showed significant association between the age, male gender and academic level and use of PCE. Our respondents used mainly caffeinated beverages and energy drink. Their choice is strongly influenced by peer pressure and the motivations are mainly to increase reading time, concentration, and alertness.

Acknowledgement: The authors wish to acknowledge medical students of Delta State University for accepting to participate in the survey. Dr. Nwogoh Bendict and Dr. Umukoro EK contributed greatly to the success of this project.

Funding: Funding is by self.

Conflict of interest: The authors have no conflict of interest to declare

REFERENCES

1. Bostrom N, Sandberg A. Cognitive enhancement: methods, ethics, regulatory challenges. Science and engineering ethics. 2009 Sep;15:311-41.

2. Schelle KJ, Olthof BM, Reintjes W, Bundt C, Gusman-Vermeer J, Van Mil AC. A survey of substance use for cognitive enhancement by university students in the Netherlands. Frontiers in systems neuroscience. 2015 Feb 17;9:10.

3. Schelle KJ, Faulmüller N, Caviola L, Hewstone M. Attitudes toward pharmacological cognitive enhancement—a review. Frontiers in systems neuroscience. 2014 Apr 17;8:53.

4. Husain M, Mehta MA. Cognitive enhancement by drugs in health and disease. Trends in cognitive sciences. 2011 Jan 1;15(1):28-36.

5. Sharif S, Guirguis A, Fergus S, Schifano F. The use and impact of cognitive enhancers among university students: a systematic review. Brain sciences. 2021 Mar 10;11 (3):355

6. Napoletano F, Schifano F, Corkery JM, Guirguis A, Arillotta D, Zangani C, Vento A. The psychonauts' world of cognitive enhancers. Frontiers in Psychiatry. 2020 Sep 11;11:546796.

7. Carlier J, Giorgetti R, Varì MR, Pirani F, Ricci G, Busardò FP. Use of cognitive enhancers: methylphenidate and analogs. Eur Rev Med Pharmacol Sci. 2019 Jan 1;23(1):3-15.

8. Holloway K, Bennett T. Prescription drug misuse among university staff and students: A survey of motives, nature and extent. Drugs: education, prevention and policy. 2012 Apr 1;19(2):137-44.

9. Singh I, Bard I, Jackson J. Robust resilience and substantial interest: a survey of pharmacological cognitive enhancement among university students in the UK and Ireland. PloS one. 2014 Oct

30;9(10):e105969.

10. Benson K, Flory K, Humphreys KL, Lee SS. Misuse of stimulant medication among college students: a comprehensive review and meta-analysis. Clinical child and family psychology review. 2015 Mar;18:50-76.

11. Cappelletti S, Daria P, Sani G, Aromatario M. Caffeine: cognitive and physical performance enhancer or psychoactive drug?. Current neuropharmacology. 2015 Jan 1;13(1):71-88.

12. Lane JD, Pieper CF, Phillips-Bute BG, Bryant JE, Kuhn CM. Caffeine affects cardiovascular and neuroendocrine activation at work and home. Psychosomatic medicine. 2002 Jul 1;64(4):595-603.

13. Franke AG, Bonertz C, Christmann M, Huss M, Fellgiebel A, Hildt E, Lieb K. Non-medical use of prescription stimulants and illicit use of stimulants for cognitive enhancement in pupils and students in Germany. Pharmacopsychiatry. 2011 Mar;44(02):60-6.

14. Emanuel RM, Frellsen SL, Kashima KJ, Sanguino SM, Sierles FS, Lazarus CJ. Cognitive enhancement drug use among future physicians: findings from a multi-institutional census of medical students. Journal of general internal medicine. 2013 Aug;28:1028-34.

15. Benson K, Flory K, Humphreys KL, Lee SS. Misuse of stimulant medication among college students: a comprehensive review and meta-analysis. Clinical child and family psychology review. 2015 Mar;18:50-76.

16. Champagne J, Gardner B, Dommett EJ. Modelling predictors of UK undergraduates' attitudes towards smart drugs. Trends in neuroscience and education. 2019 Mar 1;14:33-9.

17. Gudmundsdottir BG, Weyandt L, Ernudottir GB. Prescription stimulant misuse and ADHD symptomatology among college students in Iceland. Journal of Attention Disorders. 2020 Feb;24(3):384-401.

18. Emanuel RM, Frellsen SL, Kashima KJ, Sanguino SM, Sierles FS, Lazarus CJ. Cognitive enhancement drug use among future physicians: findings from a multi-institutional census of medical students. Journal of general internal medicine. 2013 Aug;28:1028-34.

19. Mazanov J, Dunn M, Connor J, Fielding ML. Substance use to enhance academic performance among Australian university students. Performance Enhancement & Health. 2013 Sep 1;2(3):110-8.

20. Abbasi-Ghahramanloo A, Fotouhi A, Zeraati H, Rahimi-Movaghar A. Prescription drugs, alcohol, and illicit substance use and their correlations among medical sciences students in Iran. International journal of high risk behaviors & addiction. 2015 Mar;4(1).

21. Lengvenytė A, Strumila R. Do medical students use cognitive enhancers to study? Prevalence and correlates from Lithuanian medical students sample. European Psychiatry. 2016 Mar;33(S1):S304

22. Ram S, Hussainy S, Henning M, Stewart K, Jensen M, Russell B. Attitudes toward

cognitive enhancer use among New Zealand tertiary students. Substance Use & Misuse. 2017 Sep 19;52(11):1387-92.

23. Lengvenyte A, Strumila R, Grikiniene J. Use of cognitive enhancers among medical students in Lithuania. Nordic Studies on Alcohol and Drugs. 2016 May;33(2):173-88.

24. Clegg-Kraynok MM, McBean AL, Montgomery-Downs HE. Sleep quality and characteristics of college students who use prescription psychostimulants non-medically. Sleep medicine. 2011 Jun 1;12(6):598-602.

25. Habibzadeh A, Alizadeh M, Malek A, Maghbooli L, Shoja MM, Ghabili K. Illicit methylphenidate use among Iranian medical students: prevalence and knowledge. Drug design, development and therapy. 2011 Feb 3:71-6.

26. McCabe SE, Knight JR, Teter CJ, Wechsler H. Non medical use of prescription stimulants among US college students: Prevalence and correlates from a national survey. Addiction. 2005 Jan;100(1):96-106.

27. Dresler M, Sandberg A, Ohla K, Bublitz C, Trenado C, Mroczko-Wąsowicz A, Kühn S, Repantis D. Non-pharmacological cognitive enhancement. Neuropharmacology. 2013 Jan 1;64:529-43.

28. Corazza O, Bersani FS, Brunoro R, Valeriani G, Martinotti G, Schifano F. The diffusion of performance and image-enhancing drugs (PIEDs) on the internet: the abuse of the cognitive enhancer piracetam. Substance Use & Misuse. 2014 Dec 6;49(14):1849-56.

29. Hockenhull J, Wood DM, Dargan PI. The availability of modafinil and methylphenidate purchased from the internet in the United Kingdom without a prescription. Substance Use & Misuse. 2020 Jan 1;55(1):56-65.

30. Mooney R, Simonato P, Ruparelia R, Roman Urrestarazu A, Martinotti G, Corazza O. The use of supplements and performance and image enhancing drugs in fitness settings: A exploratory cross sectional investigation in the United Kingdom. Human Psychopharmacology: Clinical and Experimental. 2017 May;32(3):e2619.

31. Carroll BC, McLaughlin TJ, Blake DR. Patterns and knowledge of nonmedical use of stimulants among college students. Archives of pediatrics & adolescent medicine. 2006 May 1;160(5):481-5.

32. Sharif S, Fergus S, Guirguis A, Smeeton N, Schifano F. Assessing prevalence, knowledge, and use of cognitive enhancers among university students in the United Arab Emirates: A quantitative study. Plos one. 2022 Jan 26;17(1):e0262704.

How to Cite: This article should be cited as: Uchendu AP, Uchendu OJ. The Use of Cognitive Enhancers among Medical students of Nigerian Tertiary Institutes. Afr. J. Trop. Med. & Biomed. Res. 2023; 6(1): 25-35.
https://dx.doi.org/10.4314/ajtmbr.v6i1.3