

Stimulant: A correlate of brain fag syndrome among undergraduate students in a Nigerian University?

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Abstract

Context: Brain fag syndrome (BFS) is a culture-bound syndrome that occurs commonly among African people involve in intellectual activities like students. The features include intellectual (cognitive) impairment, somatic symptoms, disturbances of affect, and sleepiness. The Psychophysiological Theory identifies the use of stimulants as an etiological basis for the development of BFS; however, few researchers have linked BFS with stimulants use.

Aims: This study was to determine the prevalence of BFS, investigate whether there was an association between the use of stimulants and BFS and to find out sociodemographic factors that may be associated with BFS.

Settings and Design: University campus, a cross-sectional study with undergraduate students as respondents.

Subjects and Methods: Multi-stage sampling technique was used to select 500 students, who completed questionnaires consisting socio-demographic characteristics, BFS scale (BFSS), and the stimulant use section of the World Health Organization Questionnaire for Student Drug Use Survey; while observing standard ethical conditions.

Statistical Analysis Used: Statistical Package for Social Sciences (SPSS) was used, employing Chi-square and frequency distribution.

Results: The prevalence of BFS was 42.9%. There was a significant association between stimulant use and BFS; thus giving credence to the Psychophysiological Theory of causation of BFS by Morakinyo. No sociodemographic variable was found to be associated with BFS.

Conclusions: The control of use of stimulants is at the crux of the prevention of BFS.

Key words: Brain fag syndrome, culture-bound, Psychophysiological Theory, stimulant

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Introduction

Brain fag syndrome (BFS) is a culture-bound syndrome^[1-3] first described by Prince in Nigeria,^[4] and it occurs commonly among African people involved in intellectual activities like students. In 1962, Prince described the features of the syndrome; which consist of: “(1) Intellectual impairment manifesting as inability to grasp the meaning of materials read, poor retention, and recall, and difficulty with concentrating while reading. (2) Unpleasant sensations such as heat or burning, pains, aches, and peppery feeling around the head and neck that are associated with the study; either coming on when a student attempts academic activity or may be continuously present but becoming

exacerbated when studying. Other sensory disturbances include blurring of vision or just seeing blank. (3) Fatigue and sleepiness in spite of adequate rest. (4) Affective disturbances may or may not be present, or volunteered by the student but may take the form of fear, anxiety and/or depression if present”.^[5] Prince called the syndrome, “brain fag” since this was a phrase used by the students to describe the illness, which they believed was the result of brain fatigue. BFS has been observed among students in other parts of Africa or students of African origin studying abroad. On the contrary, the syndrome is rare among Caucasians.^[6-10]

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There are contentions whether BFS is a separate nosological entity. Various researchers have classified it as a depressive disorder, somatization disorder, and anxiety disorder or an anxiety depressive equivalent. Neki and Marinho^[11] classified BFS as either a depressive disorder or anxiety state; Jegede, Anumonye, and Peltzer *et al.* opined that it was an anxiety-depression equivalent;^[12-14] while Mbanefo, Ayorinde, Ebigbo and Ihezue, Nwezie, and Ezeilo classified BFS as a somatization disorder.^[15-19] Fatoye and Morakinyo regard BFS as a distinct syndrome which incorporates features of somatization, obsession, and depressive disorders.^[20] Ola *et al.* posited that BFS was real and not a myth.^[21] “The confusion about the nosological status of BFS seems to result from speculative opinions, failure to define the syndrome properly by authors, lack of biological markers to complement the clinical phenotype of the condition and the fact that most studies did not use the BFS scale which is based on the definition of the syndrome”.^[21] Nevertheless, the components of the syndrome draw a line of demarcation between it and other related ones; hence, the reason for BFS as a distinct diagnostic entity. In addition, this could be one of the reasons the International Classification of Diseases grouped it under “Neurotic, Stress Related and Somatoform Disorder, F48.8,^[22] while the Diagnostic and Statistical Manual regards it as a culture-bound syndrome (“Appendix I: Outline for Cultural Formulation and Glossary of Culture-Bound Syndromes”).^[2]

A few reports may indicate that BFS is common. Prince reported an average prevalence of 54% among secondary school students in Ibadan, Nigeria.^[5] Peltzer *et al.* reported a prevalence of 25% among secondary school students in South Africa,^[14] Fatoye reported 38.9% in Ilesha,^[23] and Eeguranti reported 24.2% among secondary school students in Oshogbo.^[24] Recently, Uchendu in a study of BFS among students of the University of Abuja reported a prevalence of 36%.^[25]

What are some of the factors that contribute to the genesis of BFS? Theories of causation have included the Forbidden Knowledge Theory and the Ego Energy Theory, both proposed by Prince.^[26] The Psychophysiological Theory was put forward by Morakinyo.^[27] Among the three theories, the most appealing is the Psychophysiological Theory, which links the genesis of BFS with sleep deprivation due to stimulant use. Prince’s Forbidden Knowledge Theory posits that the ancestors forbade books and western education at the inception of western colonization in Africa; that the African manifests symptoms of BFS as an unconscious way of refusing to accept books and western education in conformity with the ancestors’ proscription of books. The Ego Energy Theory states that the African lacks the requisite ego energy to cope with western type of education. While Morakinyo’s Psychophysiological Theory, also called Circular Theory^[28] argues that “learning in a second language and assimilating western designed education pose

challenges and stress. Individuals involved in academic activity may then use stimulants to keep awake to study. This leads to sleep deprivation. Persons with susceptible personality traits such as high neuroticism may then develop symptoms of BFS.”

Despite the report by the proponent of the circular theory, few researches have linked BFS to the use of stimulants by students. This study intended to determine the prevalence of BFS, explore the relationship between the use of stimulants, and BFS as well as other factors that may be associated with BFS.

Subjects and Methods

The study was carried out among university undergraduate students at the University of Benin, Benin City, Nigeria. A multi-stage sampling technique was used to recruit 500 students. The assessment and measures consisted of sociodemographic characteristics, BFSS,^[5,27] and the Stimulant Use Section of the World Health Organization Questionnaire for Student Drug Use Surveys.^[29] Using the prevalence rate of 36% for BFS morbidity among the University of Abuja Students,^[25] a sample size of 354 was calculated using the Fisher’s formula.^[30,31] However, the sample size was increased to 500 to improve accuracy and also to accommodate inadequately completed questionnaires. The multi-stage sampling technique involved selecting respondents in stages from Faculties through departments until the final sampling units were arrived at. At stage one, seven Faculties out of the existing 13 Faculties were selected by simple random technique (balloting); stage two involved selection of one department from each of the selected seven Faculties by simple random technique. This applied to Faculties with multiple departments, for example, Social Sciences, Education, etc., At stage three, across selected Faculty/departments, respondents were selected from 300-level students by systematic sampling. One decided to use 300 level students because most of them would have spent at least 2 years in the university and in most cases have completed half of their university educations. They are “midway” in the academic and socioeconomic experiences in the university system. Thus, 300 level students were considered as the most representative of the university undergraduate students’ population compared to other levels. Previous works on university undergraduate students’ population also recruited participants from 300 level students.^[25,32,33] Yunusa *et al.*^[33] described “300 level as the make/break year for students, hence the motivation to use psychoactive substances”. The number of students selected from each department/Faculty were determined by the population of such Faculty using equal sampling ratio (proportional allocation).

The BFS scale (BFSS) which was the second part of the instrument used for this study is diagnostic and also

measures severity of the illness. The instrument covers symptoms of the syndrome. It was designed by Prince^[5] and modified by Morakinyo.^[27] It has seven items and each item has three possible responses (often, sometimes, and never) with assigned scores of 2, 1, and 0. Thus, the largest score is 14 which imply most severe case of BFS, while the minimum score is 0, which signifies no illness. To name a case, two conditions are met. The respondent must score at least six totals and must score at least one on each of items 4 and 5. Items 4 and 5 assess bodily symptoms like crawling sensation or heat in the head while studying and the difficulty these bodily symptoms pose to study. It has been used in previous studies.^[5,20,23-25,34] It is a valid and reliable instrument.^[35] The third part of the instrument consisted of the second part of the Stimulant Use Section of the World Health Organization Questionnaire for Student Drug Use Surveys designed by Smart *et al.*^[29]

Respondents are required to indicate whether they have ever used each of the stimulant or not, and whether they have used them in the past 1 year, or in the past 30 days, age at first use, and frequency of use are also inquired after. Thus, it is possible to determine 30-day (current), 1-year, and lifetime prevalence rates. The instrument has been used in different cultures and countries including Nigeria. It was validated in Nigeria by Adekan and Odejide and has a high validity and a mean test–retest reliability of 86.7% for all items of the questionnaire.^[36] The questionnaires were administered while the students were in class, before they began lectures.

Approval was obtained from the authorities of the University of Benin and Ethics and Research Committee of the University of Benin Teaching Hospital while written informed consent was obtained from the respondents; confidentiality and anonymity were observed, and respondents did not have to write their names on the questionnaire. Any 300 level undergraduate student of the University, who was selected by the sampling method and agreed to participate, was included in the study while any student that chose not to participate in the study, or that was too ill to participate was excluded. Data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 16.0 (SPSS Inc., Chicago, USA).^[37]

Results

Of the 500 instruments administered, 496 questionnaires were returned. This yielded a response rate of 99.2%. But 14 of the returned questionnaires had many missing data or inconsistent responses or both and were, therefore, discarded. Thus, a total of 482 (96.4%) instruments was analyzed.

Table 1 shows the characteristics of the respondents. About 207 of the respondents, representing 42.9%, were identified

Table 1: Characteristics of the respondents

BFS status	Number (%)
Caseness	207 (42.9)
Noncaseness	275 (57.1)
Stimulant use	
Lifetime use	235 (48.8)
Past year use	199 (41.3)
Current use	190 (39.4)

BFS=Brain fag syndrome

Table 2: The association between BFS and respondent's characteristics

Respondent's characteristics or variable	n (%)		P value
	BFS cases	Noncases of BFS	
Current stimulant use			
Users, n=190	149 (78.4)	41 (21.6)	0.0001*
Nonusers, n=292	58 (19.9)	234 (80.1)	
Sex			
Male, n=277	115 (41.5)	162 (58.5)	0.26
Female, n=205	92 (44.9)	113 (55.1)	
Age (years)			
15-26, n=464	196 (42.2)	268 (57.8)	0.15
27-41, n=18	11 (61.1)	7 (38.9)	
Marital status			
Single, n=471	202 (42.9)	269 (57.1)	0.86
Married, n=10	5 (50.0)	5 (50.0)	
Separated, n=1	0 (0)	1 (100.0)	
Religion			
Christianity, n=474	201 (42.4)	273 (57.6)	0.15
Islam, n=6	4 (66.7)	2 (33.3)	
Others, n=2	2 (100.0)	0 (0)	
Years already spent in the university			
1-2, n=402	167 (41.5)	235 (58.5)	0.18
3-8, n=80	40 (50.0)	40 (50.0)	
Father's educational status			
No formal education, n=16	8 (50.0)	8 (50.0)	0.93
Some primary and completed primary education, n=57	25 (43.9)	32 (56.1)	
Some secondary and completed secondary education, n=114	50 (43.9)	64 (56.1)	
Incomplete tertiary and completed tertiary education, n=295	124 (42.0)	171 (58.0)	
Family set up			
Monogamous, n=386	163 (42.2)	223 (57.8)	0.57
Polygamous, n=96	44 (45.8)	52 (54.2)	
Parental relationship			
Not applicable (parents do not live together), n=51	20 (39.2)	31 (60.8)	0.31
Friendly, n=422	181 (42.9)	241 (57.1)	
Not friendly (they quarrel a lot), n=9	6 (66.7)	3 (33.3)	
Difficulty in paying school fees or buying school materials			
Sometimes, n=160	73 (45.6)	87 (54.4)	0.56
Always, n=18	6 (33.3)	12 (66.7)	
Never, n=304	128 (42.1)	176 (57.9)	

Contd...

Table 2: Contd...

Respondent's characteristics or variable	n (%)		P value
	BFS cases	Noncases of BFS	
Religiosity			
Very religious (i pray regularly), n=303	124 (40.9)	179 (59.1)	0.29
Just religious (i pray occasionally), n=160	72 (45.0)	88 (55.0)	
Not religious (i hardly pray), n=19	11 (57.9)	8 (42.1)	
Faculty			
Education, n=45	26 (57.8)	19 (42.2)	0.16
Social and Management Science, n=256	103 (40.2)	153 (59.8)	
Applied sciences (pharmacy, BMS, life sciences), n=102	42 (41.2)	60 (58.8)	
Pure sciences (physical sciences), n=79	36 (45.6)	43 (54.4)	
Birth position among father's children			
First, n=121	51 (42.1)	70 (57.9)	0.62
Second, n=77	28 (36.4)	49 (63.6)	
Third, 76	34 (44.7)	42 (55.3)	
Fourth, 66	27 (40.9)	39 (59.1)	
Others n=142	67 (47.2)	75 (52.8)	
Residence			
Home, n=36	13 (36.1)	23 (63.9)	0.53
University hostel, n=257	109 (42.4)	148 (57.6)	
Private/nonhome accommodation, n=189	85 (45.0)	104 (55.0)	

*Significant at $P < 0.0001$. BFS=Brain fog syndrome; BMS=Biomedical science

as BFS cases while 275 (57.1%) were noncases. Thus, the prevalence of BFS was 42.9%. About 235 respondents, representing 48.8% had used stimulants. Thus, the lifetime prevalence of stimulant use was 48.8%. About 199- respondents; representing 41.3% had used stimulants in the 12 months prior to the study. Thus, the past year prevalence of stimulant use was 41.3%. About 39.4%-, representing 190 of the respondents had used stimulants in the past 30 days prior to this study. Therefore, the prevalence of current stimulants use was 39.4%.

Table 2 shows the association between respondents' characteristics (variables) and BFS. There was a statistically significant association between current stimulant use and BFS ($P < 0.0001$). More than three-quarters of current stimulant users had BFS, whereas far less than one-quarter of nonusers of stimulant had BFS. No other variable was significantly associated with BFS.

Discussion

The prevalence rate of BFS in this study was 42.9%. This rate is lower than the 54% reported by Prince.^[5] The fact that Prince's study is an older study may explain the difference in prevalence rates. However, the 42.9% is higher than the prevalence rate of BFS of 24.2%, 25% and 38.9% reported by Eeguranti,^[24] Peltzer *et al.*,^[14] and Fatoye,^[23] respectively. These rates may have been lower because the studies were among secondary school students who may have less academic challenges than what obtains in the

university. The 36% prevalence rate of BFS reported by Uchendu^[25] may have been because of his sampling method which recruited participants from all six fully developed Faculties of the University where he carried out his study. This high prevalence of BFS underscores the need to quickly put machinery in place to enhance students' mental health especially as it concerns BFS which is associated with study difficulty.^[20,25]

The findings of this study show that BFS is significantly associated with stimulant use. Similarly, Morakinyo, Fatoye and Morakinyo, Eeguranti, Ola and Igbokwe, Uchendu found significant association between BFS and stimulant use,^[20,24,25,27,35] therefore, giving credence to the Psychophysiological Theory of BFS. It would appear that a significant way to ameliorate BFS would be to control the use of stimulants. There was no significant difference between the sociodemographic characteristics of the students who had BFS and those who did not have BFS. Prince,^[4] Morakinyo,^[27] Guinness,^[38] Peltzer *et al.*,^[14] and Peltzer^[39] reported that low socioeconomic class and financial difficulty were associated with BFS. Fatoye^[40] found an association between financial strain and BFS but reported that there was no difference in the gender, family set up, residence, and parental relationship of BFS cases and noncases. Peltzer *et al.*^[14] also reported that there was no significant difference between the prevalence of BFS in males and females. However, earlier studies reported that BFS was more prevalent in males.^[4,11,40] But these studies were carried out at a time when there was less number of females attending school. In the past, many parents preferentially educated male children. The number of parents who have this mind-set seems to have reduced as more females are now in school. The numbers of females using stimulants may have also increased as the drive to achieve academically may now be equal in both gender (hence, both gender use stimulants to keep awake to study). In the past, society saw high academic pursuit as the prerogative of males.

Conclusion

Drawing from the Psychophysiological Theory of BFS, which has been further validated by this study, stimulant use has to be ameliorated to reduce the prevalence of BFS. There is a need for massive campaign against the use of stimulants.

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