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Academic stress and menstrual disorders among female undergraduates in Uyo, South Eastern Nigeria – the need for health education

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Summary: The aim of this study was to determine the association between academic stress and menstrual disorders among female undergraduates in Uyo, South Eastern Nigeria. Three hundred and ninety-three (393) female students of the University of Uyo, ages between 16 and 35 years were randomly selected from different departments in the University, and studied during the 2009/2010 academic session. Menstrual history and Student's Stress Assessment Questionnaire (SSAQ) were used for this assessment. They were distributed for participants to fill out. Prevalence of menstrual disorder among participants was 34.6%. A direct association between menstrual disorder and academic stress was observed. Commonest menstrual disorder was menorrhagia (37.5%). Others were: Pre-menstrual Syndrome (PMS 33.1%), Oligomenorrhea 19.9%, and amenorrhea 5.9% ($P < 0.05$). Those who experienced academic stress had about 2 times chances of having menstrual disorders. (OR : 2.0, C.I = 1.224-2.837) at $P < 0.05$. This study demonstrated a significant association between academic stress and menstrual disorder among females undergraduate in Uyo, South Eastern Nigeria.

Keywords*:* Academic stress, Menstrual disorders, Female undergraduates, Nigeria

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INTRODUCTION

Menstruation is typically a universal event during a woman's reproductive life. Its onset known as menarche may be characterized by a number of irregularities. Research findings in some Western population showed that post menarchial irregularity was reported in 43 to 62% of girls during the first year of menstruation, and in some it persisted for 3 to 5 years (Van Hooff et al, 1998, Demir et al, 2000, Lee et al, 2006, Cakir et al, 2007). If persistent, menstrual disorder/irregularity becomes a major gynaecological problem in adolescence and adult life. It has been shown to have adverse impact on daily activities such as avoidance of exercise or outdoor activities and increase in number of days absent from school (Klein, 1981). The spectrum of menstrual disorder/irregularity ranges from disorder of cycle length to disorder of flow. These include: absence of menstruation (amenorrhea), excessive or prolonged flow (menorrhagia), light, infrequent or delayed flow (oligomenorrhea), painful menstruation (dysmenorrhea) and Pre-menstrual Syndrome (PMS). These disorders are very common in women with high prevalence rate, ranging from 30 to 70% (Gordley et al, 2000).

Apart from the physiological variation, many other factors have been found to cause menstrual disorders in adolescent. These include: environmental, nutritional, drugs, physical activities and stress (physical, emotional and mental) (Pamela 2009). The effect of stress particularly chronic stress) on females menstrual characteristics have been confirmed by an impressive body of cross-sectional and prospective studies (Christiani et al, 1995, Mei et al, 2010). Consistent associations have been observed for cardiovascular, musculoskeletal disorders, mental illness and both prevalence as well as severe menstrual irregularities (Kivimaki et al, 2006, Stansfeld et al, 2006, Deeney et al, 2009).

Perceived stress in the College/University setting may take the form of academic stress. This involves multiple stressors such as academic demands, financial, time, health related and self imposed type of stressor (Pamela 2009). Academic demands component of academic stress include the student's

perception of the extensive knowledge base required and the perception of inadequate time to develop it (Carveth et al, 1996). Students report experiencing academic stress predictably, with the greatest sources of academic stress being found in taking and studying for examinations and with respect to grade competition and large amount of content to master in a small amount of time (Abouserie 1994). All these will put the female undergraduate under ever increasing tension. These have been associated with negative health outcomes including depression and physical illness such as (lack of energy, loss of appetite, headache, sleep problems and gastrointestinal problems) (Winkelman, 1994, Mori, 2000 and Pamela, 2009).

Anecdotally, women residing in a residential academic setting reported increased academic demands (e.g. examination period) and associated menstrual symptoms (Pamela, 2009). It is therefore conceived that academic stress experienced by these female college students may be implicated as negatively affecting the menstrual symptoms experienced by them. The uniqueness of the dynamics between academic setting and individual perception, severity, and distress of symptoms experienced warrant investigation. Thus, the overall goal of this research work was to determine the association between academic stress and menstrual disorders and subsequently create the awareness and understanding among undergraduates. This will help them to stay off other forms of stressful life style which could precipitate serious adverse health and future reproductive crises such as infertility and premature menopause.

MATERIALS AND METHODS

This was a cross sectional survey of 393 full time female undergraduates randomly selected from different departments in University of Uyo, South Eastern Nigeria, during the 2009/2010 academic session. Eligibility criteria include: gynaecologic age (i.e. calendar age minus menarche) $\geq$ 3 and a candidate in the 2009/2010 second semester examination. Exclusion criteria were: alcoholics, smoking, athletics, pregnancy, recent history of abortion or miscarriage, poor feeding habit, declinging participation and those on drugs such as contraceptives. Informed consent was obtained from participants and a comprehensive questionnaire was administered to the students for them to fill out. This was overseen by the study research coordinator. Participants were asked about personal demographic details, and gynecologic history (age at menarche in years and months, menstrual status at the beginning of the semester (3 months before the 2nd semester examination) and menstrual status during the examination. Four broad categories of menstrual disorders were identified: absence of menstrual flow for the past 90 days, (amenorrhea), heavy flow (quantity of flow more than 80ml per flow) (menorrhage) light, infrequent or delayed flow (oligomenorrhea) and associated tension, irritability, dysphoria predating onset of menstrual flow (premenstrual tension). Participants with any of these were classified as having menstrual disorder.

Student's Academic Stress Scale (SASS) was used to assess the level of stress among the participants. This scale measured the stress response for qualification and documentation in the university students stress response domains: affective, behavioral, cognitive, and psychological. Respondents rate how much of the time they experienced symptoms on a 5-points Likert Scale with the anchors; none of the time(1), A little of the time (2), Some of the time (3), Most of the Time (4), and All the time (5). Items were summed for subscale scores, and subscales were summed for the total SASS stress response score. Higher scores indicated a greater stress response. Items for SASS were generated from a review of the general stress and academic stress literature.

Information on age of participants, menarche, marital status, reproductive history (including contraceptive use, childbirth), alcohol intake, smoking habit, feeding pattern strenuous exercise during the examination were also obtained.

Statistical analysis

Descriptive statistics were generated. Mean and standard deviations (SDS) were calculated for continuous variable and frequencies for categorical variables. The independent sample t-test (for continuous variables) was performed to compare differences between the group with presence or absence of menstrual irregularities. Moreover, the Chi-square test was also applied to test differences in menstrual characteristics among subjects who noticed menstrual changes before and during examination. All calculations were performed with Statistical Package for Social Sciences (SPSS) version 17.0.

RESULTS

The mean age and the age at menarche were 22.30 years and 14.0 years respectively. Fifty percent of the subjects or participants were drawn from 200level, 29.4 percent from 300level, 18.4percent from 400level and 2.20 percent from 500level. The prevalence rate of menstrual disorders was

34.6percent. Comparative analysis of the age, age at menarche, examination stress, year of study and days within cycle of one menstrual period to another

Table 1a:

Independent Sample t-test comparing participant's age, age at menarche and Exam/academic stress of subjects with and without menstrual disorders.

Characteristic	Menstrual Changes		P-value
	Yes (n=136)	No (n=257)	
Age (mean ±SD)	22.29 ± 3.30	22.25 ± 3.92	0.901^{NS}
Age at menarche (mean ±SD)	14.11 ± 1.39	13.95 ± 1.40	0.896^{NS}
Exam/academic stress (mean ±SD)	27.31 ± 1.96	15.44 ± 1.65	$< 0.00^{**}$

**P < 0.01 significant at 1%, *P < 0.05, significant at 5% and P > 0.05 not significant at 5%.

Table 1b:

Chi-square test comparing years of study and days within cycle of subjects with menstrual disorder and those without menstrual disorder.

Characteristic	Menstrual Changes		P-value
	Yes (n=136)	No (n=257)	
Year of study			
200L	68 (50%)	118 (45.9%)	
300L	40 (29.4%)	82 (37.9%)	0.275^{NS}
400L	25 (18.4%)	56 (21.8%)	
500L	3 (2.2%)	1 (0.4%)	
Days within cycle			
≤ 21 days	12 (8.8%)	3 (1.2%)	
21 – 28 days	52 (38.2 %)	78 (30.4%)	< 0.00**
29 – 35 days	61 (44.9%)	155 (60.3%)	
>35 days	11 (8.1%)	21 (8.2%)	

**P < 0.01 Significant at 0.01, P < 0.05 not Significant at 0.05.

T**able 2**:

Comparison of menstrual characteristics of subjects before and during examination (n = 136)

Menstrual characteristics	Examination condition		*P*-value
	Before	During	
Amenorrhea	0 (0%)	8 (5.9%)	0.015
Menorrhagia	65 (47.5%)	56 (37.5%)	
Oligomenorrhea	10 (7.4%)	27 (19.9%)	
Premenstrual syndrome (PMS)	20(14.7%)	45 (33.1%)	

$X^2 = 8.395$, df = 2, $P<0.05$ significant

Table 3:

Association between examination/academic stress and menstrual disorders (odd ratio and 95% C.I)

Examination Stress	Menstrual disorders (odd Ratio and 95% C.I)	
	Model I	Model II
Low	1.00	1.00
High	1.863 (1.224-2.837)	1.757 (1.116-2.765)

Model I: no adjustment; Model II: adjustment for age, age at menarche, year of study, exercise, drug, feeding habit, alcohol, smoking habit, and other sources of stress.

between groups with or without menstrual irregularities are presented in Table 1.

Twelve (8.8%) of those who reported menstrual changes during the examination had cycle length less than 21 days, 38.2% had cycle length between 21 to 28 days, and 44.9% had cycle length between 29 to 35 days. Only 8.1% had cycle length greater than 35 days. Female undergraduates who experienced menstrual disorders reported significant high scores on academic stress (27.31±1.96), (P< 0.05) than those who did not (15.44±1.65). The number of reported cases of menstrual disorder differs significantly based on the days within cycle of menstrual period. Furthermore, the result of Chi-square test investigating association between menstrual characteristics (Amenorrhea, Menorrhagia, oligo-menorrhea, and Premenstrual syndrome) and exam condition showed a statistical significant association between menstrual characteristics and examination condition ($X^2 = 8.395$, P<0.05). These results are presented in table 2.

Menorrrhagia was the commonest and the most prevalent menstrual disorder (37.5%) during examination, followed by premenstrual syndrome

(PMS) 33.1 %, then oligomenorrhea 19.9% and amenorrhea 5.9%. Finally, the results of binary logistic regression analysis are presented in table 3. The odd ratio of 1:1:863 (about 1:2) was obtained between those who experienced low and high academic stress for Model I, with 95% confidence interval (C.I) of 1.224 - 2.837, this result was significant at 5% ($P < 0.05$) . For binary logistic regression with adjustment (model II), the odd ratio of 1:1.757 with 95% C.I of 1.116 - 2.765 were also obtained between those who experienced low and high academic stress. The results obtained for model II were also significant at 5% ($P < 0.05$).

DISCUSSION

In this study, prevalence of menstrual disorders among female undergraduates was 34.6%. Common menstrual disorders before and during examination were: menorrhagia, premenstrual syndrome and oligomenorrhea, However, amenorrhea, premenstrual syndrome (PMS) and oligomenorrhea were specifically marked during the examination than before the examination. There was a strong and significant association between academic stress menstrual disorders. Those who reported a high level of academic stress had about two times likelihood of having menstrual disorders than those without academic stress. These findings are consistent with previous studies on stress and associated menstrual disorders (Mei et al, 2010). A U.S Study indicated that stressful work (high demand in combination with low control) was related to short menstrual cycle length in a group of healthy working premenopausal women (Fenester et al, 1999), while another study among U.S military personnel found that life event stress was significantly associated with abnormal menstrual cycle length, hyper menorrhea and dysmenorrheal (Gordley et al, 2000). Similarly, using prospective data from a group of predominantly white, well- educated U.S women, Barsom et al showed that changes in levels of stress due to critical life events were related to the changes in the length of the menstrual cycle intervals and duration of bleeding (Barsom et al, 2004). Among Chinese women working in cotton textile mills, similar effect of stress on menstrual functions was observed (Christiana et al, 1995: Wang et al, 2004). In a study by Jenifer and colleagues to investigate the influence of stress on the menstrual cycle among newly incarcerated women, menstrual dysfunction was common in that population, 9% reported amenorrhea, while 33% reported other forms of menstrual irregularities (Jenifer et al, 2007). A number of stressors were associated with menstrual irregularities including: having a parent with history of alcohol or drug problem, childhood physical or sexual abuse. Also, Matteo and Harlow each in a separate work found that self-reported measures of stress correlated with longer menstrual cycle (Matteo, 1987). In Enugu, Nigeria, a study of menstrual disorders in adolescent school girls was carried out. The result showed prevalence of menstrual disorders in 69.4% of participants. Dysmenorrhea, pre-menstrual syndromes and short menstrual cycle were characterized (Nwankwo et al, 2010), as observed in this study.

A contrary result was obtained in U.S in a study aimed at assessing the effects of academic stress on menstruation among 23 juniors taking the Medical College Admission Test (MCAT),one of the most competitive and anxiety-creating examination before gaining admission into the medical college. Candidates were assessed a month before, during and a month after examination and no change in pattern of menstruation was observed (Willey, 2007).This could have been due to the effect of other confounding factors.

However, this study has a lager sample size than the above mentioned and therefore provides more reliable result. Again individual differences in adapting to stress which could be affected by factors such as environment, socioeconomic background and genetic could also account for this disparity (WHO, 1998). Event in this study some students who were expose to similar degree of stress were still having their normal menstrual flow, supporting the theory of individuals differences in stress adaptation.

Consistent explanations have been given by a large number of researchers to explain the mechanism by which stress affect women's menstrual cycle (Constantine et al, 2002). Physiological mechanism suggest that excessive and prolonged activation of the hypothalamic-pituitary adrenal axis by stress may alter hormonal profiles, increasing the level of corticotrophin releasing hormone (CRH) and glucocorticoid (cortisol) (Mie Z. et al, 2010). Cortisol increases brain function and slows or stops other non-essential body functions, such as cellular growth, digestion and reproduction (Kalantaridou et al, 2004). Consequently, the synthesis and metabolism of gonadotrophins and estrogen are suppressed (Constantine et al, 2002), thereby disrupting the woman's menstrual function. In their studies, Sandler and Bruce found that cortisol levels were highest among women with longer menstrual cycle (Sandler and Bruce, 1999). Other researchers have postulated the suppression of this axis by stress. Which of these two is right is left for the future researchers to decide.
This study has demonstrated a strong and significant association between academic stress and menstrual disorders and is consistent with studies within and

outside Nigeria. Health education should include the effect of stress on student's health and the need to stay off other stressful life style among students especially during examination. However, there are some limitations worth nothing, the effect of other confounding factors such as adiposity indices of participants, parent's socioeconomic status and the family size, which were not considered in this study. Even so, this study obtained its strength and precision from the sample size which was larger than that of the previous studies.

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