NISEB Journal Vol. 14, No. 1, March, 2014 1595-6938/2014
Printed in Nigeria (2014) Nigerian Society for Experimental Biology
http://www.nisebjournal.org

Dysmenorrhea: Relationship to Body Mass Index (BMI) and Blood Pressure

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***ABSTRACT**: Dysmenorrhea constitutes a major gynecological challenge amongst adolescent and young adult females. The use of Non Steriodal Antiinfamatory Drugs (NSAIDS) has been identified as the commonest group of drugs for the management of dysmenorrhea amongst Nigerian undergraduates. NSAIDS and BMI are close associates of cardiovascular disease like high blood pressure. This study investigates the effect of BMI and blood pressure on dysmenorrhea. We carried out a cross sectional study on 240 undergraduates that were selected by a multistaged sampling technique. We obtained ethical approval from the ethical committee of the university. Subjects gave informed consent for the study and we gave them a semi-structured questionnaire for the study. Blood pressures, weight and the height of the subjects were measured respectively with sphygmomanometer, bathroom scale Hana BR-9011 UK and a standard standiometer. BMI was equal to weight(Kg)/height^2(m). 158 (77.5%) had dysmenorrhea while 46 (22.5%) had eumenorrhea. The mean age of the subjects with dysmenorrhea was 19.16 $\pm$ 2.98 while the mean age of the subjects with eumenorrhea was 19.97 $\pm$ 2.43 ($p = 0.07$). The mean ages for menarche for subjects with dysmenorrhea and eumenorrhea were 12.49$\pm$2.43 and 12.51$\pm$ 2.41 respectively ($p = 0.961$).The BMI for subjects with dysmenorrhea and eumenorrhea were 21.28 $\pm$ 1.02 Kg/m^2 and 20.74$\pm$ 2.12 Kg/m^2 ($p = 0.017$). The difference in the blood pressures for eumenorrheic subjects and dysmenorrheic subjects were not significant statistically. Thus, increased body mass index is a risk factor for dysmenorrhea.*

Keywords: Dysmenorrhea, Eumenorrhea, BMI, Blood pressure

Introduction

Dysmenorhhea constitute a colossal gynecological challenge among adolescent and young adult females. Studies have shown that it is the most common gynecologic disorder among females adolescent, with a prevalence of 67.7% to73.83%[1, 2]. School absenteeism viz a viz poor academic performance secondary to dysmenorrhea has been well documented [3]. The risk factors for dysmenorrhea are age less than 20 years, nulliparity, heavy menstrual flow, smoking, high/upper socioeconomic status; attempts to lose weight, physical activity, disruption of social networks, depression and anxiety [4].

Anthropometry is a technique developed in the late nineteenth century by anthropologist. An anthropologist called Richer discovered it. The purpose of anthropometric measurements is to quantify the major compositional determinant of body weight. Human body composition can be studied at five different levels, namely anatomic, molecular, cellular, tissue system and whole body [5]. Human bodies need exercise to functions well and stay healthy. Many of the diet related chronic diseases are closely linked to activity patterns and efforts to improve nutritional well-being need to consider this fact [6]. The body mass index is a statistical measurement derived from height and weight. Although it is considered a useful way to estimate healthy body weight, it does not measure the percentage of body fat.

Body mass index greater than 30kg/m^2 i.e obesity have adverse effect on health, leading to reduced life expectancy and or increased health problems.[7, 8, 9]. Body mass index greater than 30kg/m^2 increases the likelihood of various diseases, particularly heart disease, type 2 diabetes, obstructive sleep apnea, certain types of cancer and osteo arthritis. BMI less than 18.5kg/m^2 is underweight, while BMI between 18.5kg/m^2 and 24.9kg/m^2 is normal weight and BMI between 25.0kg/m^2 and 29.9kg/m^2 is overweight. Generally, obesity is BMI between 30.0kg/m^2 to greater or equal to 40.0kg/m^2. BMI between 30kg/m^2 and 34.9kg/m^2 is class1 while obesity BMI between 35.0kg/m^2 and 39.9kg/m^2 is class11 obesity and BMI greater or equal to 40kg/m^2 class111 obesity. The adverse effect of increased body mass index especially obesity on health has been well documented. With a paradigm shift to the western life style there is bound to be a mass increase in the body mass index. We had shown in our previous study that among Nigerian undergraduates. Non Steroidal Anti-inflammatory Drugs (NSAIDS) was the commonest drug of choice for the management of dysmenorrhea [10]. The cardiovascular and other systemic effects of the long term use of NSAIDS is well documented [11, 12]. High body mass index has been cited has a close associate of cardiovascular disease like hypertension. Our objective was to examine whether high body mass index viz a viz blood pressure predispose one to dysmenorrhea.

Materials and Methods

A descriptive cross sectional study was carried out among female Nigerian undergraduates of Ambrose Alli University, Ekpoma, Edo state. A total of 1,400 undergraduate students from 7 Faculties participated in the study. They were selected using a multistage sampling technique as follows; from a list of 7 faculties in the university four were selected by simple random sampling using table of random numbers. Students were then randomly selected from all the lecture theatres of these 4 faculties. Ethical clearance was taken from the ethical committee of the institution. The essence of the study was explained to them and consent was taken from those who subscribed to participating in the study. A pretested semi structured questionnaire containing both open and closed ended question was administered to each subscriber. The questionnaire was used to extract basic demographic data.

Blood pressures of subjects were measured using the mercury sphygmomanometer with an appropriate sized cuff. Blood pressure measurement began after the student sat quietly for three minutes. This measurement was recorded. Body weight was measured in kilogram using Bathroom Scale Hana BR-9011 UK . Subjects were made to put off their shoes and any piece of items on them before they were made to mount the scale. Height was measured in meters using a standard stadiometer. This was done without a foot wear. Body Mass Index (BMI) was calculated using the formula; weight in kilogram divide by height in meter squared. Results were presented in tables. Appropriate statistical analyses were done using the z-test and a probability value (p-value) of less than 0.05 was considered statistically significant.

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Results

One thousand four hundred subjects (240) subjects were recruited for the study, however 36 subjects declined as per study protocol, making 204 subjects that participated in the study. Of the 204 subjects, 158 (77.5%) had dysmenorrhea while 46 (22.5%) had painless menses i.e eumenorrhea. The mean age of the subjects with dysmenorrhea was 19.16 ± 2.98 while the mean age of the subjects with eumenorrhea was 19.97 ± 2.43. There was no significant difference between the mean ages of the groups of subjects. (p = 0.07). The mean age of menarche for subjects with dysmenorrhea was 12.49 ± 2.43 while that for subjects with eumenorrhea was 12.51 ± 2.41 (p = 0.961). The marital status for all the subjects involved in the study was single. All the subjects were Christians. Table 1 shows the blood pressure values for dysmenorrhea and eumenorrhea. There was no significant difference between pulse pressure, systolic blood pressure, diastolic blood pressure, and the mean arterial blood pressure between dysmenorrheic subjects and eumenorrheic subjects. Table 2 shows some anthropometric measurements for the subjects with dysmenorrhea and subjects who are eumenorrheic. There was a significant difference between the body mass index for subjects with dysmenorrhea and subjects who are eumenorrheic (p = 0.017).

Table 1: Blood pressure values in dysmenorrhea and eumenorrhea

SUBJECTS	PULSE PRESSURE (mmHg)	SBP (mmHg)	DBP(mmHg)	MABP(mmHg)
Dysmenorrhea n=158	44.36 ±0.64 *	113.53±1.82 $^{\alpha}$	73.53± 1.82$^{\beta}$	87.53±0.12$^{\mu}$
Eumenorrhea n=46	44.27±0.61 *	114.32±4.11 $^{\alpha}$	72.81±5.11 $^{\beta}$	86.62±5.21 $^{\mu}$
Z-test	P=0.40	P=0.06	P=0.14	P=0.08

SBP; Systolic Blood Pressure, DBP; Diastolic blood pressure, MABP; Mean arterial blood pressure. *p=0.397, $^{\alpha}$p=0.06, $^{\beta}$p=0.140, $^{\mu}$p=0.082. p<0.05 is significant

TABLE 2: Body mass index in dysmenorrheic and eumenorrheic subjects

Subjects	**Age (yrs)**	**Weight (Kg)**	**Height (m)**	**BMI (Kg/m^2)**
Dysmenorrheic n=158	19.16 ± 2.98 *	60.72 ± 9.57 $^{\alpha}$	1.73 ± 0.02 $^{\beta}$	21.28 ± 1.02 $^{\mu}$
Eumenorrheic n=46	19.97 ± 2.43 *	59.95 ± 7.73 $^{\alpha}$	1.70 ± 0.12 $^{\beta}$	20.74 ± 2.12 $^{\mu}$
Z-test	P=0.07	P=0.62	P=0.00	P=0.02

*p=0.07, $^{\alpha}$p=0.618, $^{\beta}$p=0.003, $^{\mu}$p=0.017. p<0.05 is significant

Discussion

Nutrition viz a viz BMI has been associated with some menstrual cycles abnormalities. For instance anorexia nervosa is associated with amenorrhea also it has observed that students with irregular menstruation frequently had a higher BMI[13] . Recently it was observed that there is considerable discrepancy between BMI and self-recognition of adequate body weight in young students at Ashiya college and that those with relatively high BMI scores tended to undergo insufficient food intake and dietary habits despite being within normal BMI range[14]. It is well known that inappropriate dieting often induces amenorrhea in young women and may cause ovarian dysfunction during the subsequent reproductive years[15,16]. A vegetarian low caloric diet is reported to lead to menstrual cycle disorders and short luteal phase[17,18]. Thus, dysfunction in the hypothalamic-pituitary-ovarian axis can be induced by nutritional deficiency. Our study revealed that the BMI for the dysmenorrheic and eumenorrheic subjects were essentially within normal range. However, the BMI for the subjects who suffered dysmenorrhea was statistically higher than the eumenorrheic subjects. It is known that persons with higher body mass indices (BMI ; kg/m^2) are more likely than persons with normal BMI to report idiopathic knee pain and accompanying disability[19,20,21] . Amita et al however reported that BMI was statistically not correlated with dysmenorrhea[22]. Despite this statistically significant variation in BMI in the dysmenorrheic and eumenorrheic subjects their pulse pressures and blood pressures remained statistically the same. In other words normal BMI is unlikely to have adverse effect on blood pressures. It has been widely accepted that irregular menstruation in young students is partially caused by inadequate nutritional state[23]. Recent observation revealed that young women who skip breakfast have significantly higher degree of dysmenorrhea symptoms than those who eat breakfast[24]. The chances are that these subjects are more likely to have heavier lunch and dinner with a subsequent increase in their body mass indices. However, this speculation is subject to further study. A recommended diet for the management of dysmenorrhea centers around complex carbohydrates, including whole grains, legumes, vegetables and fruits and the avoidance of polyunsaturated vegetable oils, refined sugar, alcohol, and caffeine-containing foods and beverages[25] .It has also be recommended to limit intake of dairy products and animal fats. A weight management program may be very helpful in both reducing adipose aromatase activity and facilitating more desirable estrogen metabolism and excretion[25] . It was also reported that intake of dietary fiber was inversely correlated with the menstrual pain in young Japanese women[26]. The resultant effect is a reduction in body mass index and this is in consonance with our study, which revealed that increased body mass index is a potential risk factor for dysmenorrhea.

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