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Prevalence and Types of Sexual Dysfunction Among Female Medical Students

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ABSTRACT

Background: Sexuality is a complex phenomenon that is being influenced by psychological, nutritional as well as physiological factors. Its dysfunction includes desire, arousal, orgasmic and sex pain disorders. The present study aimed to assess the prevalence of sexual dysfunction (SD) and risk factors in a cohort of both married and unmarried female students in UDS-Tamale.

Methods: The Golombok Rust Inventory of Sexual Satisfaction (GRISS) was administered to 150 female students independent of age (mean±SD: single (24.1 ± 2.0) and married (29.6 ± 5.2)) domiciled in UDS-Tamale campus.

Results: Out of a total of 150 questionnaires administered. 93 (62.0%) females returned the questionnaires, and 79 were complete and evaluable questionnaires. This represents 52.7% response rate. From this study, the age ranges as well as the mean (SD) of the age of the participants are 20 to 42 and 27.0 ± 4.8 years respectively. The mean duration of marriage is 4.6 ± 3.4 years. Majority of the studied participants are non-smokers (97.5%), do not consumed alcoholic beverages (67.1%), do not have any chronic disease (69.6%) and do not also have any family history of any chronic disease condition (55.7%). The mean income level, BMI as well as WHR are Ghc 590.1 ±406.9, 25.6 ± 3.5 kg m^{-2} and 0.8 ± 0.1 respectively. The prevalence of sexual dysfunction among the single respondent was 67.6%. The most prevalent areas of difficulties were: infrequency 81.1%, Avoidance 64.9%, non-communication 64.9%, dissatisfaction 64.9%, anorgasmia 62.2%, non-sensuality 56.8% and vaginismus 56.8%. The prevalence of sexual dysfunction among the married respondent was 54.8%. Sexual dysfunction is high in both single female (67.9%) and married female (54.8%) medical students in the study.

Conclusion: Married females in the study were more obese than single females, and the married-obese group was associated with high sexual dysfunction. Notwithstanding this however, the single-normal females had more sexual dysfunction compared to the married-normal females. The SD in the females appear to be contributed mostly by infrequency and avoidance in the single female group, whereas by dissatisfaction and infrequency in the married female group.

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Keywords: sexual dysfunction, Golombok Rust Inventory of Sexual Satisfaction, prevalence, Ghana

INTRODUCTION

As sexual beings, sex and sexuality are inherent aspects of humans' existence, and each allows for expressions of individuality through intimate experience that may be associated with both pleasure and pain (MacLaren, 1995). Sexuality is reflected through sexual feelings, values, ideas, experiences, and imagination, and is related to an individual's awareness of being either female or male. Sexual functioning refers to specific bodily

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responses that are biologically determined, gender specific, and influenced by the peripheral and central nervous systems (Francoeur, 1982), and hence a malfunctioning of any kind in one of these processes such that the normal sexual response cycle is affected somehow results in a sexual dysfunction.

The WHO International Classifications of Diseases-10 (ICD-10) defines sexual dysfunction as "the various ways in which an individual is unable to participate in a sexual relationship as he/she would wish." (WHO, 1992). The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) of the American Psychiatric Association in contrast defines sexual dysfunction as "disturbances in sexual desire and in the psychophysiological changes that characterize the sexual response cycle and cause marked distress and interpersonal difficulty" (APA, 2000).

Both definitions rely substantially on the human sexual response cycle model first proposed by Masters and Johnson (1966) and further by Kaplan (1974). In both cases, the sexual response cycle was perceived as a coordination of four major phases or stages which included, a desire (libido) stage which encompasses desire to have sexual activity and sexual fantasies; an arousal (excitement) stage which consists of subjectively felt sense of sexual pleasure and related physiological changes; an orgasm phase which consists of the climax or peaking of sexual pleasure, with release of sexual tension and the rhythmic contraction of the perineal muscles and reproductive organs; and finally a satisfaction (resolution) stage, which consists of a sense of muscular relaxation and general well-being (Basson *et al.*, 2000; De Silva, 1998).

Sexual dysfunction is a highly prevalent condition that is more prevalent in females than males (Laumann *et al.*, 1999; Shifren *et al.*, 2008). Studies have been conducted around the globe in different cohorts of males and females, with different rates reported as a result. In Ghana, various studies on SD by Amidu *et al.* (2011; 2010; 2010; 2010) and by Owiredu *et al.* (2011) in different cohorts of males and females has reported rates between 55% and 75%. The important role played by sexuality in overall life and wellbeing means that the various dysfunctions of sexuality pose a health threat, and indeed sexual dysfunction has been regarded as an important public health concern (Junuzovic, 2009).

The association between physical health and sexual activity has been elucidated in a host of studies (Laumann *et al.*, 1999; Laumann and Waite, 2008; Lindau *et al.*, 2007), and as a result numerous medical conditions have been associated with an increased risk of sexual dysfunction. These include poor general health, diabetes mellitus, cardiovascular disease, hypertriglyceridemia, hypertension, neurological disease, genitourinary disease and psychiatric disorders (Lewis *et al.*, 2004), hypogonadism (low estrogen and low testosterone), elevated prolactin, hypothyroidism or hyperthyroidism, pelvic floor dysfunction, the postpartum state, lower urinary tract conditions, persistent vaginal infections, vulvar cysts, gastrointestinal problems, arthritic pain, clitoral phimosis, pudendal or other neuropathy, lower back injury, and scar tissue from episiotomy or other surgery (Basson *et al.*, 2004). Some of these conditions have been implicated in resulting in low sexual desire as they affect mobility and physical activity (Palacios *et al.*, 2009).

Others have been showed to cause a perceived bad body image of affected persons and feelings of unattractiveness (Laumann and Waite, 2008). Still, some conditions have been implicated in causing

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pains or other physical problems such that there is some difficulty or discomfort during sexual activity (Cohen *et al.*, 2008; Lewis *et al.*, 2004).

Nonetheless, many other factors implicated as possible determinants of SD in affected persons have been overlooked. Among the umbrella of neglected factors are some lifestyle practices such as sedentary lifestyle and dietary practices, specifically the consumption of fatty diets and those rich in sugar are known to be associated with body image and feelings of unattractiveness. This study aimed to obtain data on the prevalence of the common types of female sexual dysfunction among married and unmarried female medical students in UDS-Tamale and to assess nutritional, non-nutritional and lifestyle risk factors among the female populace.

METHODS

Study Participants

In this analytical cross-sectional study, one hundred and fifty (150) female students (aged 20 years and above) were randomly sampled on the Tamale campus of the University for Development Studies, Tamale, Northern Region of Ghana between April and May, 2013. Participants must have been either married or single but cohabiting and maintained sexual relations regardless of their marital status. Participation of the respondents was voluntary and informed consent was obtained from each respondent prior to enrollment.

Ethical Approval

The study was approved by ethics committee of the University for Development Studies**.** Verbal informed consent was obtained from subjects who agreed to participate. Confidentiality of records was assured.

Socio-demographic parameters

A standard semi-structured questionnaire was administered to each participant for socio-demographic information including marital status, age, behavioral activities (exercise, smoking and alcohol consumption), and income. Exercise was defined as any activity causing light perspiration or slight to moderate increase in breathing or heart rate for at least 30 minutes. Alcohol intake on the other hand was defined as the intake of at least one bottle of an alcoholic beverage per week. On the subject of smoking, individuals were classified as smokers based on whether the respondent is in the routine of smoking at least one (1) stick of cigarette a day.

Golombok Rust Inventory of Sexual Satisfaction (GRISS)

Sexual response was assessed using the GRISS questionnaire which measures specific sexual behaviors, beliefs and attitudes. The GRISS questionnaire has 28 items on a single sheet and its use for assessing the existence and severity of sexual problems in heterosexual couples or individuals who have a current heterosexual relationship. All the 28 questions were answered on a five (5) point scale from "always" through "usually", "sometimes" and "hardly ever" to "never". It provided overall scores for the quality of sexual functioning within a relationship. In addition, the subscale scores for infrequency, non-communication, non-sensuality, dissatisfaction, vaginismus, anorgasmia and avoidance were obtained and presented as a profile. Responses were summed up to give a total raw score (ranged 28-140). The total score and subscale scores were transformed using a standard nine-point scale ranging between 1 and 9, with high scores indicating greater problems. Scores of 5 or more were considered to indicate sexual dysfunction (SD). The GRISS was chosen because it is standardized, easy to administer and score, relatively unobtrusive and substantially inexpensive. GRISS can be used to assess improvement as a result of sexual or marital therapy and to compare the efficacy of different treatment methods. It can also be used to investigate the relationship between sexual dysfunction and extraneous variables. The subscales are particularly helpful in providing profile for diagnosis of the pattern of sexual function within the couple which can be of great benefit in designing a treatment program.

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Anthropometry
The standard of World Health Organization (WHO) in the measurement of weight and height were adhered to. Height was taken using the microtoise. The microtoise was placed against a regular vertical wall with the headpiece at the top. The individuals were made to stand straight with their hands by their sides, their buttocks, shoulders and the back of their heels and head touching the wall to ensure accuracy in the measurement. We also ensured that shoes and headgears were removed to ensure accuracy. The headpiece was then lowered until it firmly touches the head. The reading was then taken up to the nearest 0.5 cm.

Weight: The weight was measured using a Salter scale calibrated to the nearest 0 before they stood on it. Also shoes and heavy clothes were removed to ensure accuracy. The students were made to stand straight with their arms hanging loosely at their sides and their eyes horizontal to the feet. The reading was taken to the nearest 0.1kg.

Statistical Analysis
The data were presented as mean ± SD and percentages. Continuous data were analyzed using unpaired t-tests whilst categorical variables were analyzed using Fischer's exact test or chi square for trend test. Association was assessed using Pearson product moment correlation coefficient between sexual dysfunction and the seven (7) subscales of the GRISS. All analyses were performed using a GraphPad prism version 6.0.

RESULTS
Out of a total of 150 questionnaires administered, 93 (62.0%) females returned the questionnaires, 8 (5.4%) out of this were incompletely filled and 6 (4.0%) were not filled at all, leaving 79 complete and evaluable questionnaires. This represents 52.7% response rate. From this study, the mean ± SD of the age of the participants was 27.0 ± 4.8 years. The mean duration of marriage is 4.6 ± 3.4 years. Majority of the studied participants were non-smokers (97.5%), did not consume alcoholic beverages (67.1%), were not physically active (76.9%), did not have any chronic disease (69.6%) and did not also have a family history of any chronic disease condition (55.7%) (Table 1).

When the studied population was stratified based on marital status, those who were married were

Table 1: General Characteristic of The Study Population Stratified by Gender

Variables	Total(n = 79)	Single (n = 37)	Married (n = 42)	P values
Age (yrs)	27.0 ± 4.8	24.1 ± 2.0	29.6 ± 5.2	< 0.0001
Smoking	2(2.5%)	1(2.7%)	1(2.4%)	0.93
Alcohol	26(32.9%)	14(37.8%)	12(28.6%)	0.86
Exercise	19(24.1%)	11(29.7%)	8(19.0%)	0.54
Disease	24(30.4%)	8(21.6%)	16(38.1%)	0.28
Disease his	35(44.3%)	16(43.2%)	19(45.2%)	0.98
Income (Ghc)	590.1 ±406.9	341.4 ± 279.6	802.4 ± 379	< 0.0001
HT (m)	1.6 ± 0.1	1.6 ±0.1	1.6 ± 0.1	0.82
WT (kg)	67.2 ±10.0	65.3 ±9.8	67.9 ± 10.7	0.21
BMI (kg m^{-2})	25.6 ± 3.5	25.8 ± 6.8	44.1 ± 22.2	< 0.0001
HC (cm)	38.6 ±4.8	38.1 ±4.0	51.3 ± 16.7	< 0.0001
WC (cm)	32.0 ±4.5	31.3 ±3.3	47.7 ±19.5	< 0.0001
WHR	0.8 ± 0.1	0.8 ± 0.1	29.7 ±34.2	< 0.0001

Continuous data are presented as mean ± s.d and compared using unpaired t-test whilst categorical data presented as proportion and compared using chi-square analysis

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Table 2: Raw and Stannine Score for the various GRISS Subscales stratified by marital status

Variables	Total (n = 79)	Single (n = 37)	Married (n = 42)	P values
GRISS Raw score				
sexual dysfunction	82.6 ± 7.0	83.0 ±8.0	82.3 ± 5.9	0.67
Avoidance	9.6 ±3.9	9.9 ±3.6	9.3 ± 4.2	0.54
Non-sensuality	12.0 ±2.1	11.7 ±1.8	12.2 ±2.3	0.36
Infrequency	6.2 ± 1.1	6.5 ± 1.2	5.9 ±1.0	0.03
Vaginismus	11.0 ± 2.4	11.1 ± 2.3	10.9 ± 2.5	0.68
Anorgasmia	11.8 ± 2.3	12.1 ± 2.4	11.6 ±2.1	0.30
Non communication	5.6 ± 1.9	5.6 ± 1.7	5.5 ±2.2	0.78
Dissatisfaction	12.4 ± 2.2	11.9 ± 2.3	12.8 ±2.1	0.08
GRISS stannine score				
sexual dysfunction	5.0 ± 1.9	5.2 ±2.1	4.9 ±1.8	0.56
Avoidance	5.0 ± 2.1	5.2 ± 1.9	4.9 ±2.2	0.51
Non-sensuality	5.0 ± 2.0	4.7 ±1.8	5.2 ± 2.2	0.35
Infrequency	5.0 ± 1.8	5.4 ± 1.9	4.7 ±1.6	0.08
Vaginismus	5.1 ±1.9	5.2 ± 2.0	5.0 ± 1.9	0.67
Anorgasmia	5.1 ±1.8	5.4 ± 1.9	4.9 ± 1.7	0.20
Non communication	4.7 ± 2.1	4.7 ±1.9	4.6 ± 2.3	0.78
Dissatisfaction	5.2 ± 1.7	4.8 ±1.7	5.4 ± 1.7	0.13

Table 3: Prevalence of Obesity Stratified by Marital Status

Variable	Single (n= 37)	Married (n = 42)	P-value
BMI			
Underweight	3(8.1%)	2(4.8%)	0.54
Normal	16(43.2%)	16(38.1%)	0.64
Overweight	16(40.5%)	14(35.7%)	0.37
Obese	2(8.1%)	10(21.4%)	0.02
WHR			
Normal	12(32.4%)	11(26.2%)	0.54
Overweight	11(29.7%)	13(31.0%)	0.91
Obese	15(40.5%)	19(45.2%)	0.67
WC			
Normal	22(59.5%)	17(40.5%)	0.09
Overweight	9(24.3%)	12(28.6%)	0.67
Obese	6(16.2%)	13(31.0%)	0.13
%BF			
Normal	18(48.6%)	13(31.0%)	0.11
Obese	19(51.4%)	29(69.0%)	0.11

significantly ($p < 0.0001$) older (29.6 ± 5.2 years) as compared to those who were single (24.1 ± 2.0 years) (Table 1). Those who are married also had higher income level with higher mean BMI, WT, WC, HC as well as WHR as compared to those who were single (Table 1).

Table 4: Univariate Analysis of Risk Factors for Female Sexual Dysfunction

Variables	SINGLE	MARRIED	P-value
	n/N*	n/N*	
Alcohol			
Yes	9/14(64.3%)	5/12(41.7%)	0.25
No	16/23(69.6%)	18/30(60.0%)	0.47
Exercise			
Yes	7/11(63.6%)	3/8(37.5%)	0.26
No	18/26(69.2%)	20/34(58.8%)	0.41
Income			
No income	2/2(100%)	1/1(100.0%)	-
<111	0/2(0%)	0/2(0.0%)	-
111-400	21/27(77.8%)	5/6(83.3%)	0.76
>400	2/6(33.3%)	17/33(51.5%)	0.41
BMI			
Underweight	1/3(33.3%)	1/2(50.0%)	0.71
Normal	12/16(75.0%)	6/16(37.5%)	0.03
Overweight	12/15(80.0%)	9/15(60.0%)	0.23
Obese	0/3(0.0%)	7/9(66.7%)	0.02
WHR			
Normal	7/12(58.3%)	4/11(36.4%)	0.29
Overweight	6/11(54.5%)	9/13(69.2%)	0.46
Obese	11/15(73.3%)	10/19(52.6%)	0.22
WC			
Normal	15/22(68.2%)	10/17(58.8%)	0.55
Overweight	6/9(66.7%)	5/12(41.7%)	0.26
Obese	4/6(66.7%)	8/13(61.5%)	0.83
%BF			
Normal	12/18(66.7%)	6/13(46.2%)	0.25
Obese	13/19(68.4%)	17/29(58.6%)	0.50

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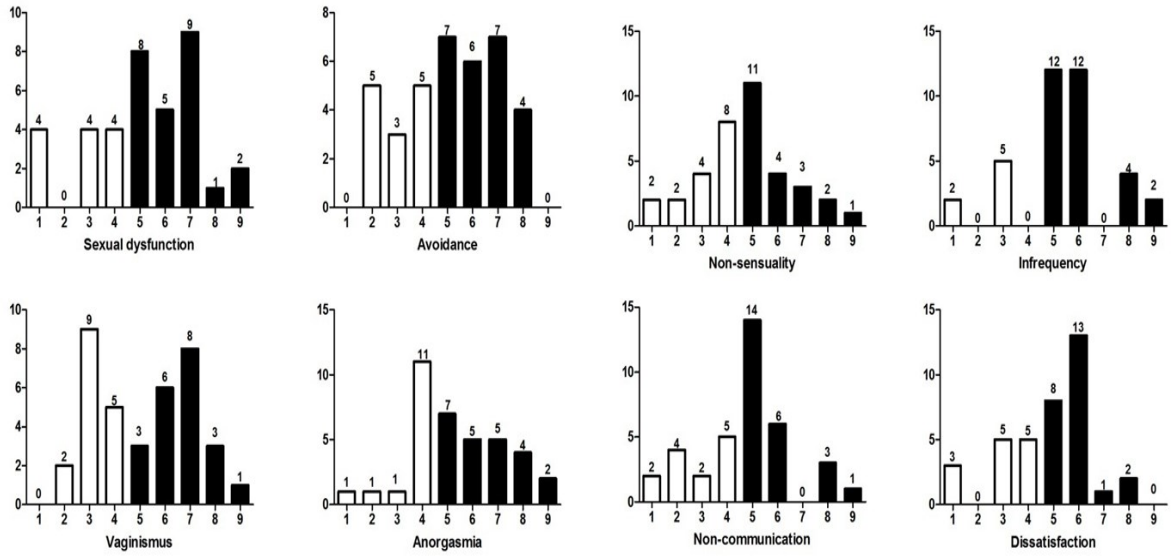

Figure 1: Participants' sexual function scores for each GRISS subscale (n = 37). Each graph shows the distribution of scores (from 1 to 9 on the x-axis) for each GRISS subscale, with the number of single women (y-axis) above each score. Normal scores are 1 to 4 (clear columns) and abnormal scores are 5 to 9 (black columns)

From Table 2, mean raw score for Sexual Dysfunction, Vaginismus and Anorgasmia of the total studied population were 82.6 ± 7.0, 11.0 ± 2.4 and 11.8 ± 2.3 respectively. When the raw scores were converted to stannine scores, the mean stannine score for Sexual dysfunction, Vaginismus and Anorgasmia are 5.0 ± 1.9, 5.1 ±1.9 and 5.1 ±1.8 respectively. Stratification of the studied population based on marital status showed that the mean raw scores as well as the mean stannine scores were similar between the married and single subjects except raw score for infrequency which was higher among the single population (Table 2).

Aside the prevalence of obesity which was significantly higher among the married participant as compared to the single population using BMI, all the other indicators of obesity did not show any significant difference in the level of obesity based on marital status (Table 3).

When the proportions of participants with SD using GRISS stanine score within the various socio-demographic characteristic was stratified based on marital status, there were no significant difference in the extent of SD among the studied population based on alcohol, smoking, exercise, income level, WHR, WC as well as %BF. However, the proportion of obese subjects with SD in the single group (0.0%) was significantly lower than those in the married group (66.7%) (Table 4).

From figure 1, the prevalence of sexual dysfunction among the single respondent was 67.6% (25 out of 37). The most prevalent area of difficulty was, infrequency (30 out of 37, 81.1). Avoidance (24 out of 37, 64.9%), non-communication (24 out of 37, 64.9%), dissatisfaction (24 out of 37, 64.9%), anorgasmia (23 out of 37, 62.2%), non-sensuality (21out of 37, 56.8%) and vaginismus (21 out of 37, 56.8%).

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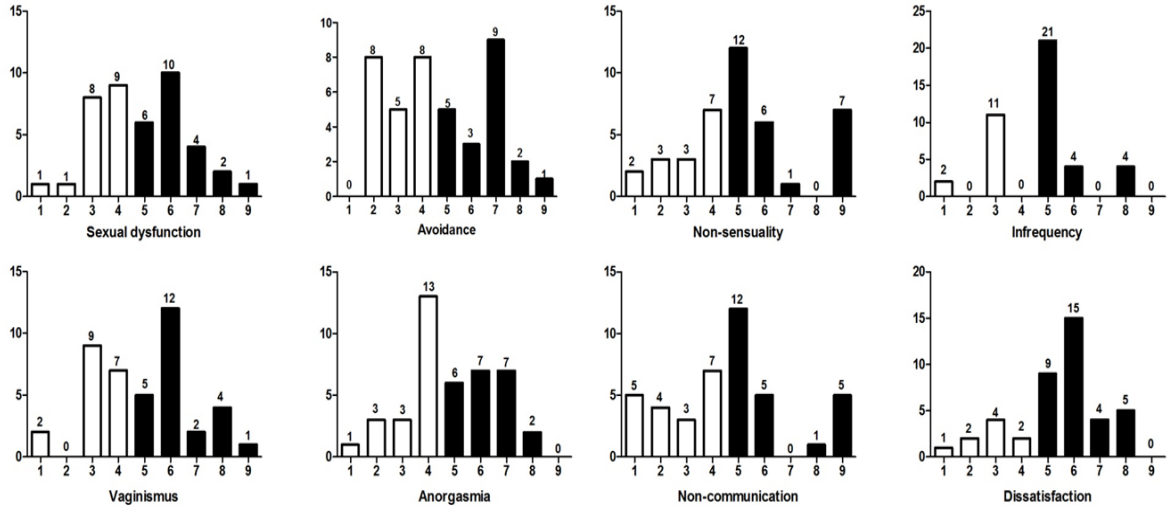

Figure 2: Participants' sexual function scores for each GRISS subscale (n = 42). Each graph shows the distribution of scores (from 1 to 9 on the x-axis) for each GRISS subscale, with the number of married women (y-axis) above each score. Normal scores are 1 to 4 (clear columns) and abnormal scores are 5 to 9 (black columns)

The prevalence of severe sexual dysfunction among the single respondent was 8.1% (3 out of 37). The most prevalent area of difficulty was, infrequency (6 out of 37, 16.2). Anorgasmia (6 out of 37, 16.2%), Avoidance (4 out of 37, 10.8%), vaginismus (4 out of 37, 10.8%), non-communication (4 out of 37, 10.8%), non-sensuality (3 out of 37, 8.1%) and dissatisfaction (2 out of 37, 5.4%), (Figure 1).

The prevalence of sexual dysfunction among the married respondent was 54.8% as shown in figure 2. The most prevalent area of difficulty among the married respondent were, dissatisfaction (33 out of42, 78.6%), infrequency (29 out of 42, 69.0%), non -sensuality (25 out of 42, 59.5%), vaginismus (24 out of 42, 57.1%), non-communication (23 out of 42, 54.8%), anorgasmia (22 out of 42, 52.4%) and avoidance (20 out of 42, 47.6%) (Figure2).

The prevalence of severe sexual dysfunction among the married respondent was 7.1% as shown in figure 2. The most prevalent area of difficulty among the married respondent were, non-sensuality (7 out of 42, 16.7%), non-communication (6 out of 42, 14.3%), vaginismus (5 out of 42, 11.9%), dissatisfaction (5 out of42, 11.9%), infrequency (4 out of 42, 9.5%), avoidance (3 out of 42, 7.1%) and anorgasmia (2 out of 42, 4.8%) (Figure2).

Among the single, age correlated positively with income (ICM), weight correlated positively with BMI and %BF. Sexual dysfunction also correlated positively with Avoidance, Non sensuality, Vaginismus, Anorgasmia and Dissatisfaction. Avoidance correlated positively with Anorgasmia. Infrequency also correlated positively with Vaginismus. However, vaginismus and Non-communication correlated negatively with Anorgasmia and Dissatisfaction respectively as shown in the upper right-hand side of (Table 5).

Also, from the lower left-hand side of (Table 5) among the married, income correlated positively with age, BMI correlated positively with weight, waist-to-hip ratio correlated positively with age, % BF correlated positively with age, weight and BMI, avoidance correlated positively with sexual dysfunction. However, anorgasmia correlated positively with sexual dysfunction and negatively

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Table 5: Pearson correlation coefficients of anthropometric parameters and sexual dysfunction as well as its sub-scales for single students (upper right-hand side) and married students (lower left-hand side)

	Age	ICM	WT	BMI	WHR	%BF	SD	AV	NS	IF	VG	AG	NC	DS
Age		0.40*	-0.13	0.26	0.05	0.31	-0.20	-0.15	-0.07	0.06	-0.24	-0.11	0.08	-0.20
ICM	0.52***		-0.18	0.22	-0.13	0.24	-0.14	-0.18	0.27	-0.26	0.03	-0.19	0.08	-0.06
WT	0.29	0.2		0.38*	0.20	0.37*	0.00	0.05	-0.10	0.16	0.12	0.14	-0.07	0.06
BMI	0.07	0.04	0.75***		0.20	1.00	-0.05	-0.22	-0.02	0.14	0.19	-0.10	0.02	0.17
WHR	0.36*	0.21	-0.09	-0.09		0.20	0.06	0.09	-0.08	0.06	-0.10	0.30	-0.05	-0.04
%BF	0.33*	0.18	0.79***	0.96***	0		-0.06	-0.23	-0.03	0.14	0.17	-0.10	0.03	0.15
SD	0.00	0.07	0.14	0.11	0.03	0.1		0.75***	0.46**	-0.04	0.49**	0.53***	-0.01	0.48**
AV	-0.28	-0.1	-0.02	0.17	0.09	0.08	0.52***		0.17	0.03	0.19	0.41*	0.04	0.13
NS	-0.03	0.03	0.05	-0.03	-0.15	-0.04	0.19	-0.29		-0.44	0.13	0.31	-0.06	0.21
IF	-0.21	-0.27	-0.09	0.08	0.05	0.02	0.03	0.17	-0.27		0.14**	-0.38	-0.06	0.23
VG	0.24	0.30	-0.06	-0.04	0.00	0.02	0.27	-0.01	-0.08	0.13		-0.19*	0.00	0.32
AG	-0.16	0.03	0.20	0.01	0.00	-0.02	0.35*	0.27	0.05	-0.14	-0.39*		-0.19	0.29
NC	0.00	0.13	0.24	0.11	0.05	0.1	0.47**	0.06	-0.01	0.05	-0.02	0.13		-0.45**
DS	0.09	-0.13	0.09	0.06	-0.08	0.08	0.29	-0.15	0.18	-0.05	-0.05	0.05	0.16	

Correlation is significant at the 0.05 level (2-tailed), **. Correlation is significant at the 0.01 level (2-tailed), * correlation is significant at the 0.001 level (2-tailed). ICM = Income, WT = Weight, BMI = Body Mass Index, WHR = waist-to-Hip Ratio, %BF = Percentage Body Fat, SD = Sexual Dysfunction, AV = Avoidance, NS = Non-sensuality, IF = Infrequency,*

with vaginismus and non-communication correlated positively with sexual dysfunction.

DISCUSSIONS

Sexual difficulties in women appear to be widespread in society, influenced by both health-related and psychosocial factors, and are associated with impaired quality of life and interpersonal relationships (Basson *et al.,* 2000). Female sexual dysfunction is hence an inherent public health concern and has been posited to be more prevalent even than male sexual dysfunction (Laumann *et al.*, 1999). The act of sex includes a woman's sexual self and self-image, intimate relationships, family, society and culture. The complexities of her environment, sexual and partner history, past relationships, mental health status, socioeconomic status, current medical problems and hormonal status all play a role (Esposito *et al.*, 2008; Roodsari *et al.*, 2005).

Women in this study were an apparently younger cohort, the majority of whom did not smoke, did not have any chronic diseases as a well as a family history of chronic diseases, and were physically inactive. Married females earned more than their single counterparts, and as expected were also older than the single females. However, an assessment of obesity among the single vs. married females showed married females to be more obese, with significant differences between all the anthropometric parameters for the two female groups. The association between marital status and obesity has often been described by researchers as complex and paradoxical (Janghorbani *et al.*, 2008), with various conflicting reports as far as an association between the two is concerned. A number of these researchers have found married women to be more obese (Ross *et al.*, 1983; Jeffrey *et al.*, 1989; Kahn *et al.*, 1991; Kahn *et al.*, 1990), while others have reported no association at all as far as married vs. single women are concerned (Gove *et al.*, 1983; House *et al.*, 1988; Kobrin and Hendershot, 1977).

Nonetheless, some few studies like Noppa and Bengtsson, (1980) as well as Noppa and Hallstrom,

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(1981) have even reported an inverse relationship, whereas others have showed the association to be different in males and females (Sobal *et al.*, 1992; Evers, 1987). A number of theories have been proposed to account for the possible link between obesity and marital status (Averett *et al.*, 2008), and one particular one which supports a positive association as observed in this study is the 'marriage market' hypothesis which proposes that married women are no longer concerned about attracting a mate and hence will care little about gaining weight (Averett *et al.*, 2008). Indeed, this observation has been made by studies by Tzotzas *et al.,* (2010), Sobal *et al.,* (2003) and Janghorbani *et al.,* (2008).

It has been posited that physical and mental health can contribute to sexual dysfunction and diseases, in the same manner the dysfunctions and diseases can contribute to physical and mental health problems (Shah, 2009). Obesity is a globally increasing epidemic which adversely affects the physical, emotional, and psycho-social well-being of individuals and it has been suggested to be associated with high risks of female sexual dysfunction just as obese men are at a high risk of SD. Notwithstanding this however, the actual link between obesity and sexual dysfunction has been generally described as unclear and obscure (Esposito *et al.*, 2008) and various conflicting results have been reported. Obese-married women in this study had more sexual dysfunction than their single counterparts. Though the high SD could be attributed to the high numbers of obese-married than obese-single females in the study, the underlying fact still remains that the majority of the obese women had high SD. This finding is corroborated by a number of studies including Senturk (2013), Esposito *et al.,* (2007), Kolotkin *et al.,* (2006) as well as Adolfsson *et al.,* (2004). Notwithstanding this however, other studies have found no association between obesity and female sexual dysfunction (Kadioglu *et al.*, 2010; Yaylali *et al.*, 2010).

Among the females in the study with no obesity, sexual dysfunction was rather higher in the single population than in the married population. This trend was also observed as far as the overall SD rate in the single females (67.6%) vs. married females (54.8%) was concerned. It has been suggested that marital status is related to health outcomes and longevity (Averett *et al.*, 2008), with married men and women especially at a lower risk of death and more likely to be healthy than unmarried persons (Janghorbani *et al.*, 2008). Married females may hence be associated with better physical and mental health, which could as a result lead to an improved sexual life. This finding is substantiated by a recent study by Pereira *et al.,* (2013) in Brazil where they observed that single women had a poorer sexual function and were more likely to have mood disorders in comparison to their peers involved in stable relationships.

Other studies have shown single females to be more associated with orgasmic disorders (Kessler *et al.*, 2005), lubrication problems (Safarinejad, 2006) as well as pain disorders (Song *et al.*, 2008; Pereira *et al.*, 2013). Moreover, the low SD observed in married vs. single females in the study could be attributed to a seemingly high socioeconomic status of the married vs. single group of females. Married females earned significantly more than single females in the study and could be considered to have a slightly higher socioeconomic standing than their unmarried counterparts. Safarinejad (2006) in their study in Iran observed that women who earned more and had a higher educational status were more likely to have an improved sexual life.

Notwithstanding the various differences in rates of SD among single-normal vs. married-normal females, single-obese vs. married-obese females, as well as the general single vs. married population, it is evident that the prevalence of sexual dysfunction in this cohort of females was still generally high. Female sexual dysfunction has been considered a highly prevalent condition, and in Ghana, two studies by Amidu *et al.,* found high prevalence rates of 72.8% (Amidu *et al.,* 2010) and 61.5% (Amidu *et al.*, 2011). The 2010 study comprised a majority of unmarried females and the SD rate, though higher, slightly compares to that obtained for single females in this study. Similarly, the 2011 study which was solely conducted among married females

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yielded a SD rate which though slightly higher, is comparable with that obtained for married females in this study. The slightly lower levels of SD observed in this study could be attributed to the selection of participants, which was done such that the contribution of confounding factors like low educational status, low earnings, and medical conditions were very much minimized. Female participants in the study were medical students, with many of them from affluent homes which affirm the reasoning being made. As a result, almost all of them could be considered to rank high socioeconomically, which could account for the slightly improved SD observed.

On the other hand, the pressures and stress associated with being a Ghanaian medical student could be playing a role in observed high SD levels in the study females. This finding is supported by Roodsari *et al.,* (2005) in their study of sexual dysfunction among married medical students in an Iranian University. The stress and pressures might have particularly confounded matters for the single females who earned less and did not have a stable partner or husband return home to.

Moreover, the single participants are likely to have their boyfriends also in the medical school who may fail to satisfy them adequately as a result of the same pressure and stress. It is hence not surprising that the most prevalent areas of difficulty as well as severe difficulty among the single females in the study were infrequency and avoidance of sexual acts. Even among the married females, infrequency was among the most prevalent areas of difficulty also. Such infrequency in the single females was likely to lead vaginismus as suggested by the positive correlation observed between the two and corroborated by Amidu *et al.,* (2010). The infrequent sex however did not construe to a dissatisfaction of the sexual act in the single females, as dissatisfaction was among the least prevalent areas of difficulty and severe difficulty.

This was however the opposite case in the married group who were generally dissatisfied with their sexual acts. Married females were nonetheless more likely to communicate to their partners about their sexual (dys) function than single females. Both group of females were however more inclined to avoid sex as a result of orgasmic problems. Other correlations were observed for sexual dysfunction and most of its subscales, as well as between some subscales with other subscales, and all these compare with previous findings by Amidu *et al.,* (2010, 2011).

Generally, females in this study were very less inclined to engage in physical activity which could also play a substantial role in SD rates as observed in the study. Though its effect on male sexual functioning is more profound, regular exercising has been shown to improve female sexual functioning and reduce female sexual dysfunction too, as supported by studies by Ponholzer *et al.,* (2005) and also by Safarinejad (2006).

CONCLUSIONS

Sexual dysfunction is high in both single female (67.9%) and married female (54.8%) medical students in the study which could be attributed to the various stresses and pressures of being in medical school. Married females in the study were more obese than single females, and the married-obese group was associated with high sexual dysfunction. Notwithstanding this however, the single-normal females had more sexual dysfunction compared to the married-normal females. The SD in the females appear to be contributed to, mostly by infrequency and avoidance in the single female group, and by dissatisfaction and infrequency in the married female group.

COMPETING INTEREST

Authors declare that they have no competing interests.

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AUTHORS' CONTRIBUTIONS

Authors SA and HI designed the study. Authors KEZ and PB performed the statistical analysis,

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wrote the protocol, and wrote the first draft of the manuscript. Author SA, HI and HI managed the analyses of the study. Authors HI and KEZ managed the literature searches. All authors read and approved the final manuscript.

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