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Original Research Article.

Seminal Fluid Analysis of a Sample of Iraqi Obese Males

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ABSTRACT

Introduction: Obesity a medical condition that may lead to reduced life expectancy and/or increased health problems. Obesity may impair the reproductive health of men that it can be considered as an infertility factor in otherwise normal men. However, there is still a controversy whether there is a relationship between male obesity and impaired sperm production.

Methods: This cross sectional study was carried out at nutrition clinic in three teaching hospitals and one obesity clinic in a medical college in Baghdad. The body mass index (BMI) calculation, fasting plasma glucose, serum cholesterol, and serum triglyceride were measured. Also, seminal fluid analysis after three days abstinence was done for all the participants.

Results: Fifty eight adult obese males participated in this study. The total sperm number had significant negative correlation with BMI and serum cholesterol.

Keywords: Obesity; Sperm Count; Sperm Motility; Sperm Morphology; Male Fertility.

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INTRODUCTION

Obesity is defined as a medical condition in which excess body fat has accumulated to the extent that it may impair health, leading to reduced life expectancy and/or potentially expanded health problem.[1] It is measured through the Body Mass Index (BMI), a simple index of weight–height relationship that indicates amount of body fat used to classify overweight and obesity in adults.[2] The obesity epidemic is a growing public health concern that it is recently classified as a disease.[3] In 2014, globally, there were more than 1.9 billion adults aged 18 years and older overweighted. Of these over 600 million adults were obese. Overall, about 13% of the world's adult population (11% of men and 15% of women) were obese.[4] While much of the focus on the impairments caused by obesity is on somatic health, recent data suggested that reproductive health may also be impacted.[5] The majority of studies published to date have focused on the contribution of female rather than male obesity. Obesity can be considered as an infertility factor in otherwise normal men.[6,7]

A decrease in sperm concentration and sperm motility is associated with decreased male fertility.[8] Sperm morphology as well is a determinant of male fertility regardless of sperm count and motility.[9] Abnormal sperm quality and reduced fertility rates have been related to obesity in men, but there is a lack of agreement on this subject.[10] There is still a controversy whether there is a relationship between elevated male BMI and impaired sperm production[11,12] or there is no relationship between male BMI and semen parameters.[13].

The effects of increased BMI in Iraqi men on the semen parameters have not been subjected to a good degree of research. Therefore, this study was designed to quantify the relation between obesity and the semen parameters, specifically: (total sperm count, total sperm motility, progressive motility, and normal sperm morphology).

METHODS

A cross sectional study was carried out at nutrition clinic in three teaching hospitals in Baghdad (Al-Imamain Al-Kadhymain medical city, Al-Kindy teaching hospital and Al-Yarmouk teaching hospital) and at obesity clinic in Al-Kindy medical college for the period from 20th February 2016 till 30th May 2017. All adult males who visited the clinics for obesity were asked to participate in the study. Consecutive sampling was used to collect the sample after taking their informed consent.

Adult male (18 to 65 years of age) with body mass index of greater than or equal to 30 were included. Those with history of hypertension or on antihypertensive drugs, those who previously diagnosed to be aspermic or azoospermic, and/or those who is diagnosed to have endocrine diseases or on treatment for these diseases were excluded from the study. Socio-demographic characteristics of each participant was obtained by the researcher, focusing on age, residency (rural or urban), marital status (single, married, widow, or divorced), occupation (type of occupation), and smoking (current and ex-smoking).

Physical examination was done to all participants stressing on height and weight measurements (to calculate the body mass index (BMI)), and blood pressure measurement were done. The weight was measured (to nearest 0.5 Kg), in erect position without shoes, coats, or overalls with an electronic scale. Height was measured by using tape height measure which is suitable to measure a person's height with an approximation of ±1 mm. BMI was calculated as body weight/height² (Kg/m²). Participants were classified as obese if their BMI is 30 kg/m2 or more.[14] Blood pressure was measured using mercury sphygmomanometer in sitting position. Participants who were diagnosed as hypertensive were excluded from the study.

Venous blood samples were withdrawn from each participant and sent for fasting plasma glucose (FPG), serum cholesterol (S.Chol), and serum triglyceride (S.TGS). Participant was considered diabetic if his (FPG) ≥ 7.0 mmol/l.[15] Serum cholesterol was considered of desirable level when it was < 200 mg/dl, borderline high when it was 200-239 mg/dl, and high when it was ≥ 240mg/dl. Serum triglyceride was considered normal when it was < 150 mg/dl, borderline high when it was 150-199 mg/dl, and high when it was ≥ 200 mg/dl.[16]

Seminal fluid analysis (SFA) was done following at least 3 days of abstinence. Semen sample was collected via masturbation and ejaculated into a clean plastic container. The specimen container was kept in an incubator at 37^{0}C. The sample was analyzed using computer assisted semen analysis (Mira-9000 CASA) for four dependent semen parameters, including: total sperm count, total sperm motility, progressive motility, and normal sperm morphology. The lower reference limits for semen analysis were as follows: total sperm count <39 million spermatozoa per ejaculate, total sperm motility <40%, progressive motility <32% , and normal sperm morphology ≤4%.[17]

Statistical Analysis

Data entered and analyzed using SPSS (Statistical Packages for Social Sciences) program, version 18. Descriptive data were expressed as means and standard deviations for continuous measurements and as frequencies and percentages for categorical measurements. Differences of semen parameters according to obesity classes were compared using analysis of variance (ANOVA) test. Relationships between semen parameters and obesity parameters were studied by Pearson correlation test. P<0.05 was set as statistically significant.

Table1: Socio-demographic, clinical, and laboratory characteristics of the participants

Variable		No	%
Age (years) Mean±SD (Range)		31.33±7.39 (19-45)	
Residency	**Rural**	5	8.6
	Urban	53	91.4
Marital Status	**Single**	29	50
	Married	29	50
Occupation	**Employed**	15	25.9
	Unemployed	34	58.6
	Student	9	15.5
Smoking	**Current**	21	36.2
	Ex	9	15.5
	Never	28	48.3
Diabetes	**Yes**	9	15.5
	No	49	84.5
Cholesterol (mg/dl)	**(Mean±SD)**	259.19±86.86 (120-400)	
	High	35	60.3
	Borderline	2	3.4
	Normal	21	36.2
Triglyceride (mg/dl)	**(Mean±SD)**	267.98±91.44 (110-405)	
	High	40	69
	Borderline	11	19
	Normal	7	12
Total sperm number (million)	**Mean±SD (Range)**	75.40±26.97 (42-168)	
Total sperm motility (%)	**Mean±SD (Range)**	45.40±8.27 (28-68)	
Sperm progressive motility (%)	**Mean±SD (Range)**	46.26±7.62 (34-66)	
Sperm morphology (%)	**Mean±SD (Range)**	43.60±12.68 (23-73)	

Table 2: Differences of semen parameters according to obesity classes.

Parameter	Obesity Class 1	Obesity Class 2	Obesity Class 3	F	P value
Total sperm number (million) (Mean±SD)	82.42±29.22	82.27±31.75	69.60±22.7	1.294	0.282
Total sperm motility (%) (Mean±SD)	46.25±8.84	44.34±8.96	46.45±8.59	0.372	0.691
Sperm progressive motility (%) (Mean±SD)	44.41±5.76	47.15±7.86	46.40±8.39	0.522	0.596
Normal Sperms morphology (%) (Mean±SD)	46.17±15.82	43.11±12.50	42.7±11.25	0.308	0.737

Table 3: Correlation of semen parameters with obesity parameters (r, P value).

	BMI	Weight	Cholesterol	Triglyceride
Total sperm number (million)	-0.269, (0.041)	0.035, (0.796)	-0.266, (0.044)	-0.274, (0.062)
Total sperm motility (%)	-0.010, (0.938)	-0.104, (0.439)	-0.054, (0.688)	-0.031, (0.818)
Sperm progressive motility (%)	-0.012, (0.930)	-0.004, (0.978)	0.086, (0.521)	0.191, (0.151)
Normal sperm morphology (%)	-0.082, (0.540)	-0.040, (0.768)	-0.060, (0.652)	0.083, (0.537)

(P values between parentheses)

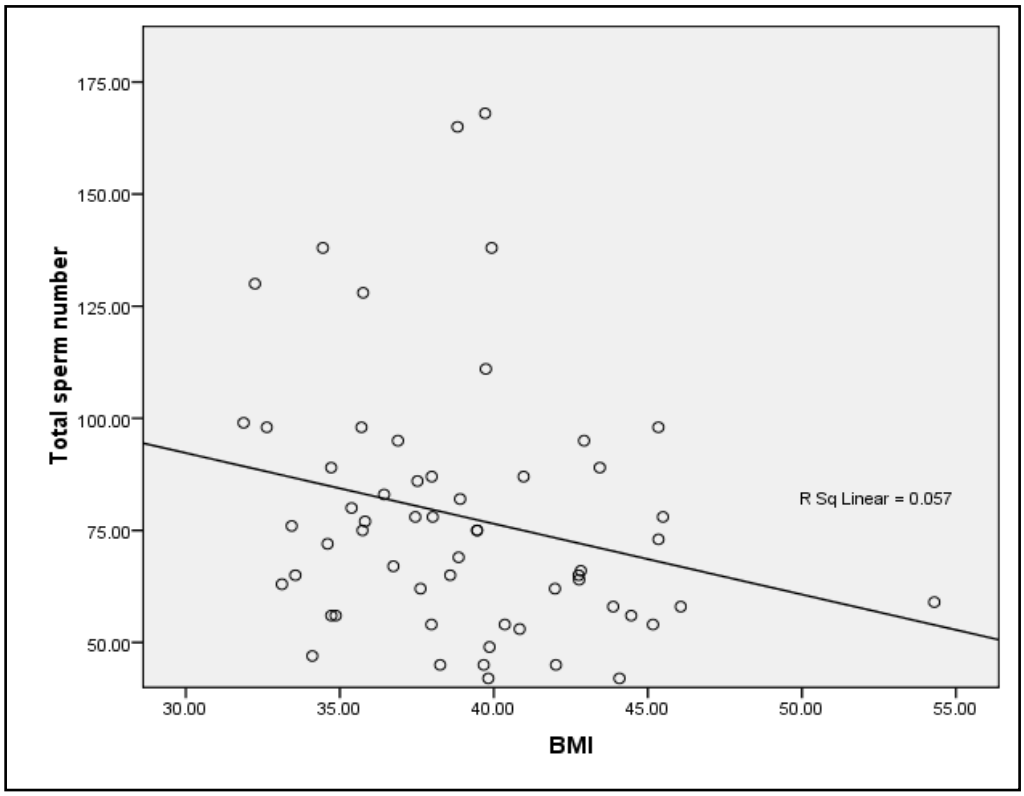

Figure 1: Relation between the body mass index (BMI) and total sperm number

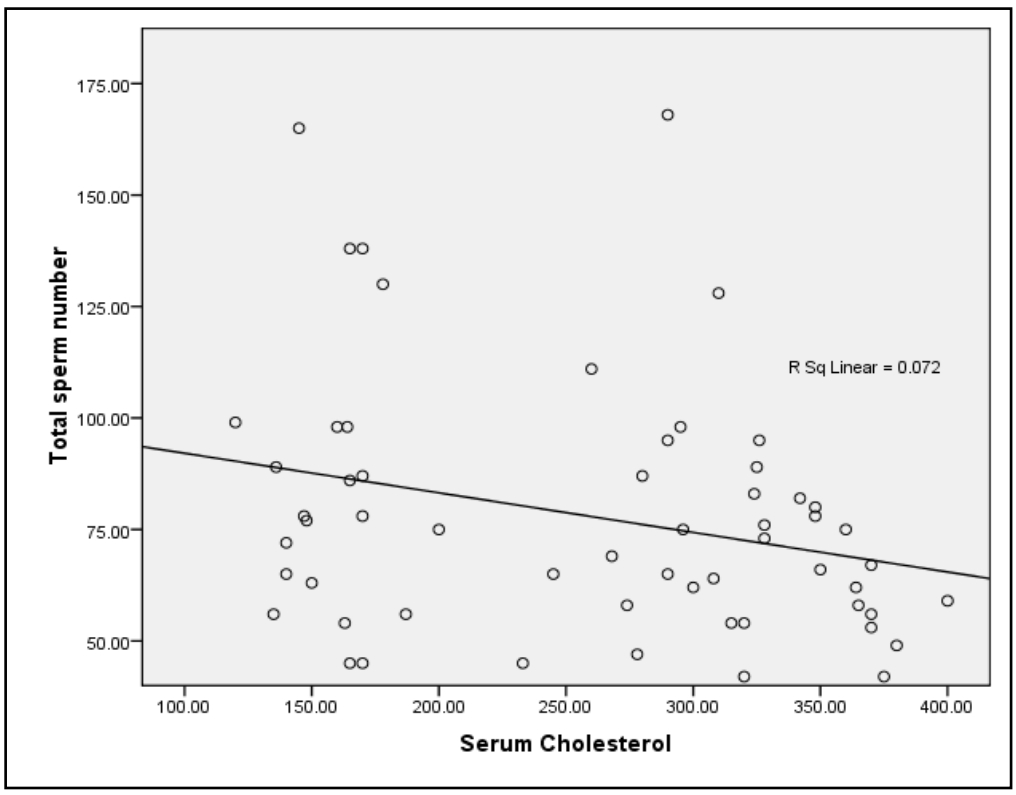

Figure 2: Relation between the serum cholesterol and total sperm number

RESULTS

Fifty eight obese men participated in this study with mean ± SD BMI was (39.06±4.32). Twelve (20.7%) participants were of class 1 obesity, 26 (44.8%) were of class 2, and 20 (34.5%) were of class 3 obesity. Socio-demographic, clinical, and laboratory characteristics of the participants were shown in table 1.

The participants can be classified according to their BMI to three obesity classes. Twelve (20.7%) participants were of class 1 obesity, 26 (44.8%) were of class 2, and 20 (34.5%) were of class 3 obesity. The differences in the semen parameters among the participants with different obesity classes were statistically not significant, as shown in table 2.

The total sperm number showed significant negative correlation with BMI and serum cholesterol but nonsignificant correlation with the weight and serum triglyceride and blood sugar. However, the values of the other semen parameters (total sperm motility, progressive sperm motility, and normal sperm morphology) showed nonsignificant correlation with the obesity parameters as shown in table 3.

DISCUSSION

Studies about the prevalence of obesity among Iraqi people were scarce. However, WHO had estimated that the prevalence of obesity among adult Iraqi people in 2008 to be 29%. The prevalence of obesity among females was 36% while among males was 22%. In 2014, the prevalence among females was 14.9% and among males was 10.8%.[18]

The mean age group of our sample was 31.33 years, 91.4% of them were from urban area, 50% were married and the other 50% were single, more than half of them (58.6%) were unemployed, and 36.2% of them were currently smokers. Owing to the scarcity of literature on this subject we were unable to compare these socio-demographic characteristics with other studies.

The present study showed that there were no significant differences in the mean level of the semen parameters among the different classes of obesity. Previous studies compared between obese and non-obese men regarding the semen parameters but no study compared between these parameters among the different classes of obesity. This study showed also that there was significant negative correlation between BMI and total sperm number. There was negative correlation between BMI and other parameters (total sperm motility, progressive motility, and normal sperm morphology). Jensen et al found that overweight and obese men had a reduction in total sperm count while the sperm motility and morphology were not significantly affected.[11] Paasch et al found that in patients aged 20–30 years, the total sperm count was significantly negatively correlated with body mass index.[19] On the other hand, Nicopoulou et al found no significant relationship between BMI and total sperm count.[20] Belloc et al found that increased BMI was associated with decreased count and motility but not the morphology.[21] Hammoud et al found that male obesity is associated with increased incidence of low sperm concentration and low progressively motile sperm count.[22] Tsao et al found that obese men had lower normal sperm morphology and sperm concentration but normal sperm motility.[23] Many other studies found no significant correlation between obesity and semen parameters.[24–30] However, Hakonsen et al found that BMI was inversely associated with total sperm count, sperm morphology, and motile sperm.[31]

A significant negative correlation between total sperm count and serum cholesterol level was demonstrated in this study while other parameters showed nonsignicant correlation with the serum cholesterol. Also, there was a nonsignificant correlation between serum TG and all the semen parameters studied. Tavilani et al noticed that there were no significant relationships between the concentration of sperm and both the serum cholesterol and TG.[32] Liu et al found that total sperm motility, progressive motility and normal sperm morphology were statistically increased with increasing cholesterol level.[33] On the other hand, Schisterman et al suggested that lipid concentrations may affect semen parameters.[34] However, Lu et al found that there was no significant correlation between serum lipids levels and semen parameters.[35]

In conclusion, the association found between BMI and semen parameters may be of help to broaden the understanding of the effect of obesity on male reproductive physiologic characteristics.

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