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## Influence of BMI on Muscular endurance and Quality of life in Overweight & Obese Post Menopausal Women: A Correlation Study

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### Abstract

**Purpose:** Obesity is a most prevalent malnutrition all over the world.<sup>[1]</sup> It is characterized by abnormal growth of adipose tissue, WHO estimates that globally over 1 billion (16%) adults are overweight amongst which 5% are obese. Menopause is best defined as the absence of menses for 12 consecutive months. It has been proposed that, in women, an accelerated loss of muscle strength and muscle mass occurs at an earlier age than in men, around the time of menopause. Menopause is associated with a natural decline in estrogen which contributes to loss of bone mineral density, increased risk of cardiovascular diseases, re distribution of subcutaneous fat to the visceral fat mass in postmenopausal females leading to obesity. The study of QoL in the post menopause has become an essential component in clinical practices so that we can encourage them to follow a good lifestyle with appropriate physical activity, as maintaining good physical functioning with age is a vital component of independence in later life. The study was carried out to find the influence of BMI on muscular endurance and quality of life in overweight and obese post-menopausal females.**Methods:** A study comprising of 50 samples was done, the data collected was analyzed using graphs and tables and presented in tabular format.**Results:** There was a moderate negative correlation between BMI and Push-Up test showing  $r = -0.703$  and there was a mild negative correlation between BMI and curl-up test showing  $r = -0.361$ .**Conclusion:** It was concluded that there is a negative correlation between BMI and endurance in post-menopausal females. This study also shows that BMI mildly affects quality of life in post-menopausal females.

**Keywords:** endurance, over-weight, obese, post-Menopause, quality of life.

### Introduction:

Obesity is a most prevalent malnutrition all over the world.<sup>[1]</sup> It is characterized by abnormal growth of adipose tissue, WHO estimates that globally over 1 billion (16%) adults are overweight amongst which 5% are obese.<sup>[1]</sup> In India the prevalence of obesity is 12.6% in women and 9.3% in men, in other words more than 100 million people are obese in India.<sup>[1]</sup> Obesity is defined as abnormal or excessive fat accumulation that presents a risk of health by WHO.<sup>[2]</sup>

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Obesity is a major risk factor for a number of chronic diseases including diabetes, cancer, cardiovascular diseases. Menopause is best defined as the absence of menses for 12 consecutive months. It has been proposed that, in women, an accelerated loss of muscle strength and muscle mass occurs at an earlier age than in men, around the time of menopause. Menopause is associated with a natural decline in estrogen which contributes to loss of bone mineral density, increased risk of cardiovascular diseases, re distribution of subcutaneous fat to the visceral fat mass in postmenopausal females leading to obesity. Excessive fat mass contributes to changes in the strength and endurance of skeletal muscles. Individuals who are obese have increased intramuscular and intermuscular fat mass, establishing a negative influence on force generation capacity and functional independence

World Health Organization defines Quality of life (QoL) as an individual's perception of their position in life in the context of culture and values system in which they live and in relation to their goals, expectations, standards and concern. The study of QoL in the post menopause has become an essential component in clinical practices. Most studies on QoL of postmenopausal women were conducted in developed countries with different sociocultural realities, which may influence not only the perception of QoL but also the experience of menopausal symptoms. Very little information exists about QoL of postmenopausal women in developing countries. In this study MENQOL (menopause specific quality of life questionnaire) is used to assess quality of life in postmenopausal women. The MENQOL is self-administered and consists of a total of 29 items in a Likert-scale format.

So, the aim of the study was to find the influence of BMI on muscular endurance and quality of life in overweight and obese post-menopausal females and the objectives of the study were as follow:

1. To find the influence of BMI on upper extremity endurance using the push up test.
2. To find the influence of BMI on abdominal endurance using the curl-up test.
3. To find the effect of BMI on quality of life in post-menopausal females using MENQOL.

#### **Methods :**

An analytical study was conducted on 50 subjects who had attained Menopause and were in the age group of 45-60 years with BMI of more than 25. Subjects with Recent fractures, Uncontrolled Hypertension, Spinal surgeries, Hospitalization in past 6 months, Psychological disorders, Cardiovascular disease, Symptomatic Osteoarthritis, Respiratory problems like Asthama, COPD were excluded from the study.

Study commenced after ethical approval from college authorities. All subjects were explained the aim and nature of the study, and those willing to participate were asked to sign the consent form. Pre screening was done for who had attained menopause and were in overweight and obese group that is body mass index above  $25\text{kg/m}^2$  according to WHO classification were included. A demonstration of both the test was given to the subjects before commencing the tests.

Push-up test: modified "knee push-up test" the position of the patient was (legs together, lower leg in contact with the mat with ankles planter flexed, back straight, hands shoulder width apart, head up, using the knees as the pivotal point). The subject's back must be straight and the subject must push towards a straight arm position. The maximal number of push-ups performed without



rest was counted as the score. The test is stopped when the subject is unable to maintain the appropriate technique within two repetitions.

**Curl up test:** Two marks at a distance of 8 cm apart (for clients/patients 45 >yr). Subjects are to lie in a supine position, knees bent at 90° with feet on the floor and arms extended to their sides, such that their spines to 30°, reaching their hands forward until their fingers touch the second strip of tape. A metronome was set at 40 beats/min. At the first beep, the subject begins the curl-up, reaching the top position at the second beep, returning to the starting position at the third, top position at the fourth, etc. Repetitions are counted each time the subject reaches the bottom position. The test is concluded either when the subject reaches 75 curl-ups, or the cadence is broken. Every subject will be allowed several practice repetitions prior to the start of the test.

**MENQOL:** We used the Menopause-Specific QOL (MENQOL) questionnaire for measuring the QOL in postmenopausal women. This questionnaire consists of 29 items in vasomotor (3 items), psychosocial (7 items), physical (16 items) and sexual (3 items) domains postmenopausal women. This questionnaire has seven-point Likert scale and ranges from 0 to 7. A "zero" is equivalent to a woman responding "no", showing she has not experienced this symptom in the past month. Score "one" shows that the woman experienced the symptom, but it was not bothersome at all. Scores "two" through "seven" show increasing levels of bother experienced from the symptom and correspond to "1" through "6" check boxes on the MENQOL. Each item was manually calculated into a 0-7 score. Hence, the average for each domain was calculated between 0 and 7. The high scores in MENQOL subscales indicate low QOL. The investigator asked the questions to the subjects and marked their answers.

#### **Data analysis:**

Spearman correlation coefficient test was used to correlate between BMI with Muscular endurance and Quality of life. The Data was analyzed using "Primer" statistical package software.

#### **Results:**

There was a moderate negative correlation between BMI and Push-Up test showing  $r = -0.703$  and there was a mild negative correlation between BMI and curl-up test showing  $r = -0.361$ .

#### **Discussion:**

The objectives of this study were to find out the correlation of BMI with endurance and quality of life in post-menopausal females.

The findings of this study revealed a negative correlation between BMI and muscular endurance in Post-menopausal women. Menopause is best defined as the absence of menses for 12 consecutive months. The transition through menopause is a life event that can profoundly affect quality of life. Endurance can be affected by strength of an individual muscle, group of muscle, or the total body.

Study supporting these results was done by Noha Abdel Kader et.al in 2016 who conducted a study on Relation between body mass index percentile and muscle strength and endurance. This study suggested negative correlation between BMI percentile and endurance time of quadriceps



and triceps muscle. Higher proportion of fast fatigable fibers in the skeletal muscles of obese human was observed when compared with those in lean subjects. Thus concluding that there was a negative correlation of BMI with endurance.

Another study having similar results was done by Maryam Rahimi et.al in the year 2013 the study suggested that BMI was negatively associated with abdominal endurance as obese individuals showed poorer performance in abdominal endurance as compared with normal weight. Isolated muscle preparation show that obesity often leads to a decrease in force produced per muscle cross-sectional area, and power produced per muscle mass. Obesity and ageing have similar physiological changes. The synergistic effects of obesity and ageing on muscle function may exacerbate morbidity and mortality. Furthermore, obesity is associated with physiological changes at the muscular level, including a decrease in blood supply thereby limiting the supply of oxygen and energy sources. When performing sustained contractions, these physiological changes may lead to faster onset of muscle fatigue.

Current study also reveals that quality of life is mildly affected in both obese and overweight women.

The study supporting these results was done by NabarunKarmakar et.al in 2017 who carried out a study on Quality of life among menopausal women. The study suggested that menopause causes both physical and psychiatric problems. Almost all areas or domains evaluated were impaired in menopausal women thus concluding that menopause has a mild effect on quality of life in post-menopausal women.

Another study supporting this result was done by MakbuleNeslisah tan et.al in the year 2014. This study suggested that BMI has no association with decreasing quality of life in post-menopausal females. A high BMI potentially implies a greater amount of adipose tissues, and this may alleviate the symptoms by converting adrenal androgens to estrogens. Also, menopausal symptoms may be associated with endogenous estrogen levels and fluctuations in estradiol level which are associated with weight gain .

Another study supporting these results was done by FatemehShobeiri et.al who carried out a study on Quality of Life in Postmenopausal Women in Iran: A Population-based Study. In our study, 45 to 49 years old women had significantly higher scores in all the QOL domains. Aging in women decreased the scores of QOL except for 60 to 65 years old women whose scores increased again in psychosocial, physical and sexual domains. Aging in vasomotor domain decreased QOL scores.

Another study supporting this results was done by Lama Al-mehaisen et.al on impact of menopause on quality of life. This study suggested that menopausal symptoms commonly affect a larger number of early and post-menopausal and adversely affect the quality of life but there is a minimal difference in the frequency and severity of other symptoms with duration.



### Conclusion:

The study concludes that there is a negative correlation between BMI and endurance in post-menopausal females. This study also shows that BMI mildly affects quality of life in post-menopausal females.

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**Tables**

**Table 1:- AGE DISTRIBUTION**

AGE (YRS)	NO. OF INDIVIDUALS
45-50	27
51-55	16
56-60	7

**Table 2: WEIGHT DISTRIBUTION**

CATEGORY	NO.OF INDIVIDUALS
OVERWEIGHT	22
OBESE	28

**Table 3:- Correlation of BMI and Push-up test.**

	R	S.D	P value
BMI	-0.702	2.626	0.001
Push-up test		2.242	

**Table 4:- Correlation of BMI and Curl up test.**

	R	S.D	P value
BMI	- 0.361	2.626	0.001
Push-up test		3.274	

**Table 5: BMI with vasomotor component of MENQOL**

Category	vasomotor	
	mild	moderate
Obese	96.30%	3.70%
Overweight	91.30%	8.70%



**Table 6: BMI with physical component of MENQOL**

	Physical	
CLASS	mild	moderate
Obese	96.30%	3.70%
Overweight	91.30%	8.70%

**Table 7: BMI with psychosocial component of MENQOL**

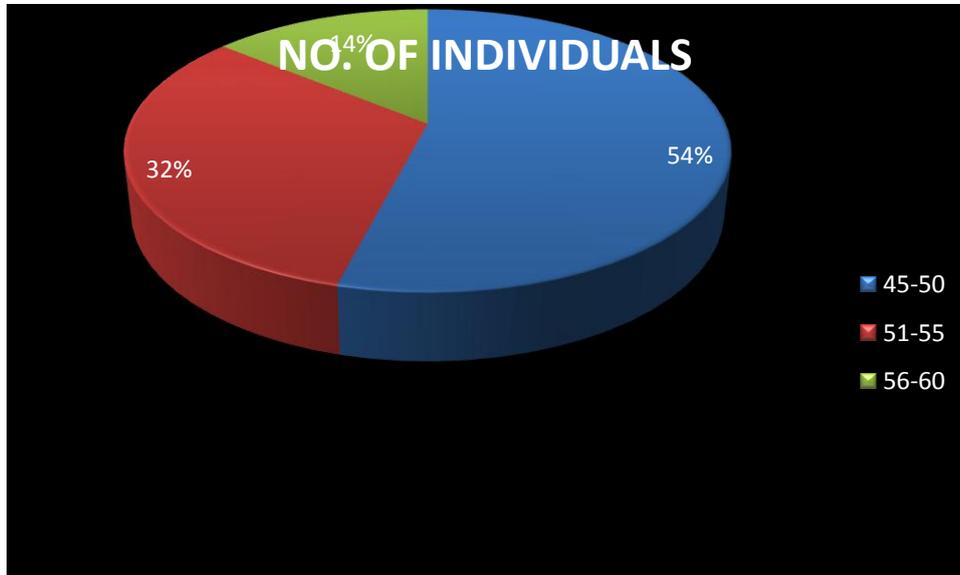
	Psychosocial	
Class	Mild	Moderate
Obese	96.30%	3.70%
Overweight	91.30%	8.70%

**Table 8: BMI with sexual component of MENQOL**

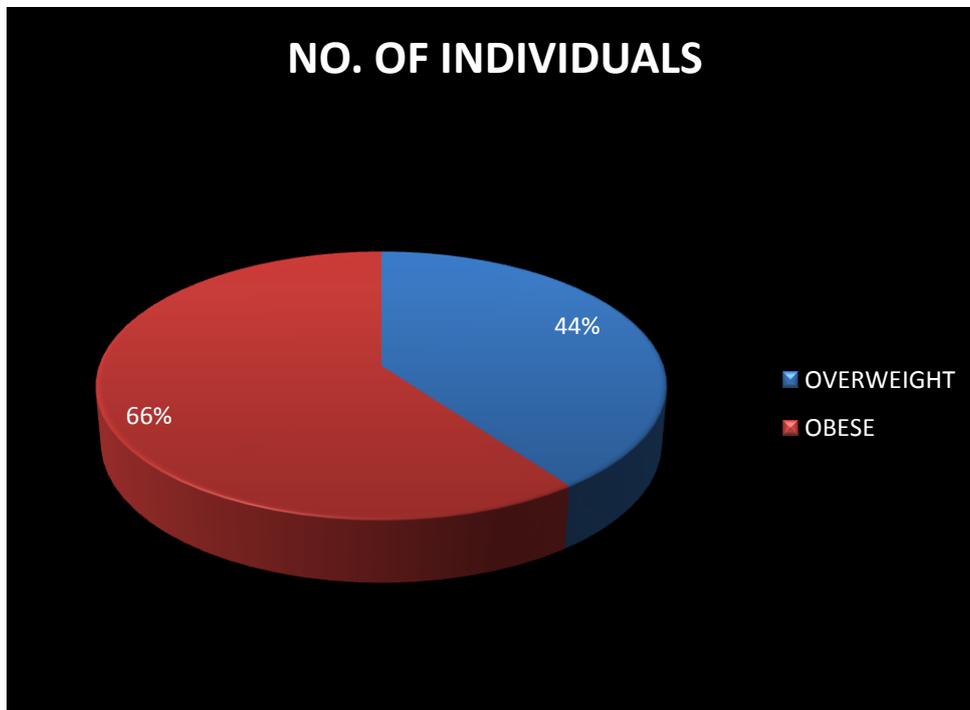
	Sexual	
Class	Mild	Moderate
Obese	92.59%	7.41%
Overweight	95.65%	4.35%



**Graph 1: AGE DISTRIBUTION**

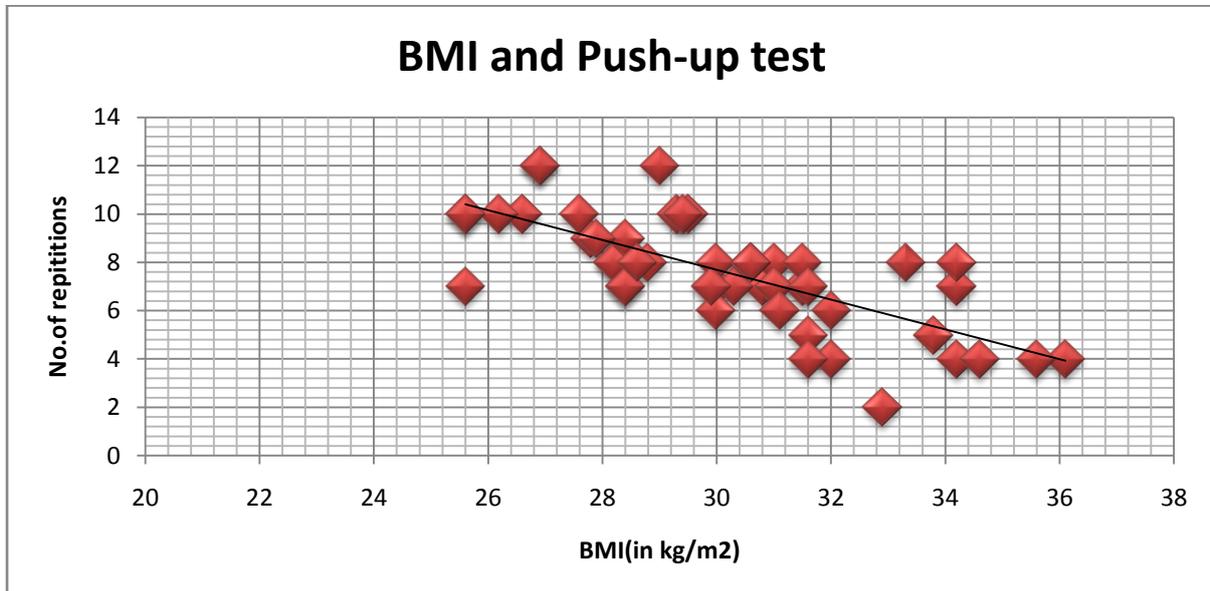


**Graph 2: WEIGHT DISTRIBUTION**

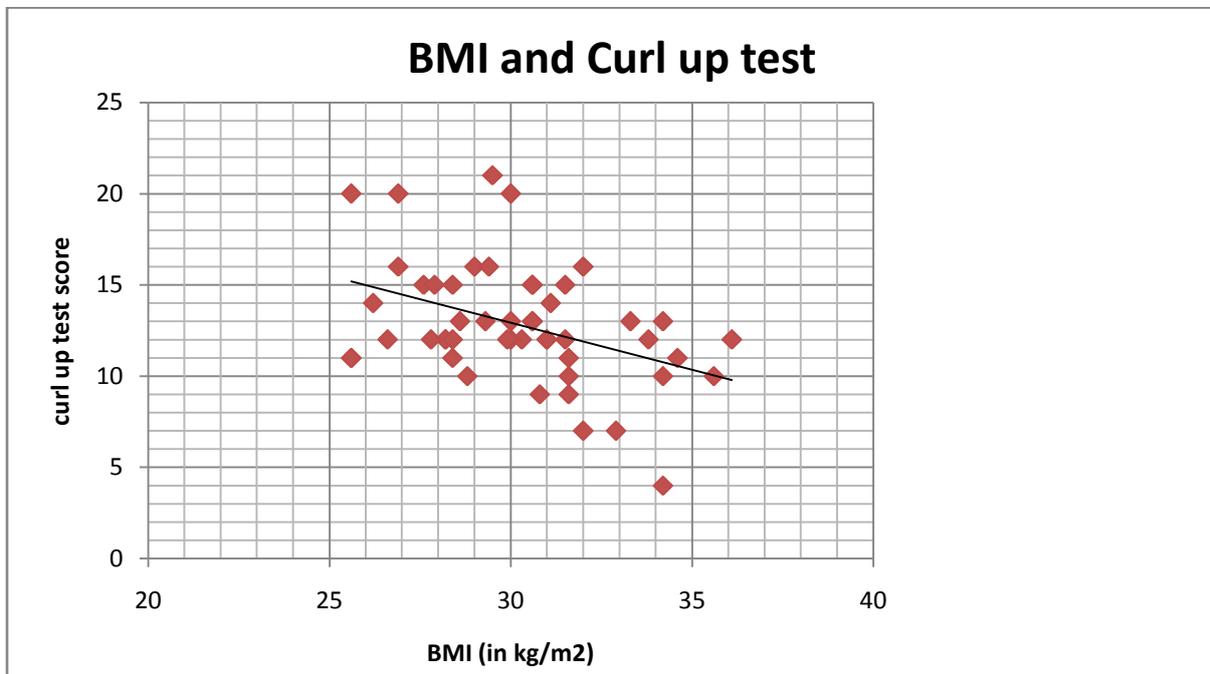




**Graph 3:-Correlation of BMI and Push-up test**

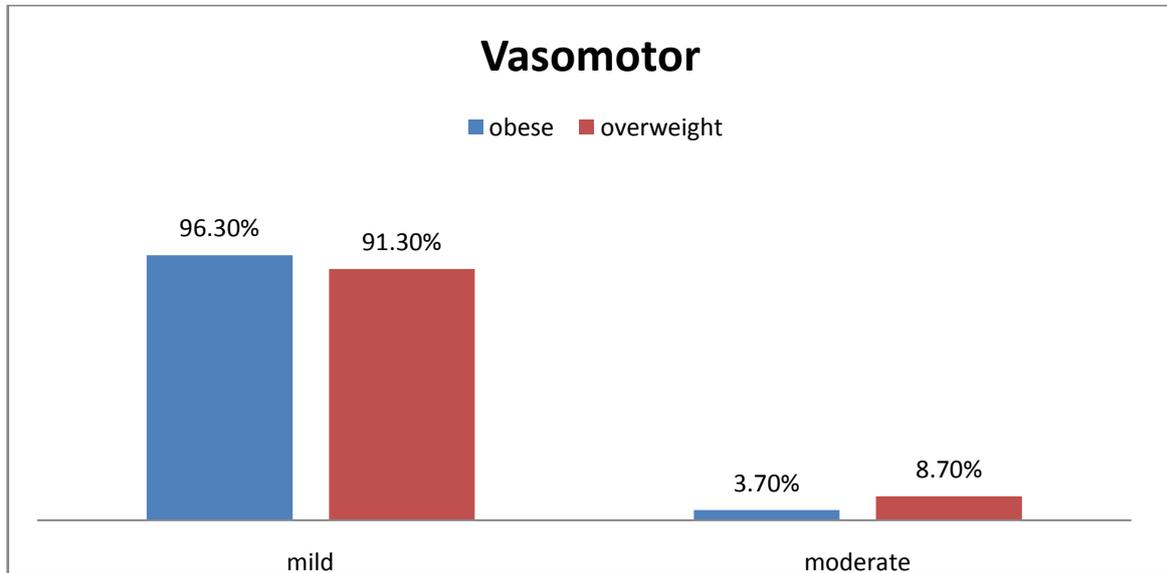


**Graph 4:Correlation of BMI and Curl up test.**

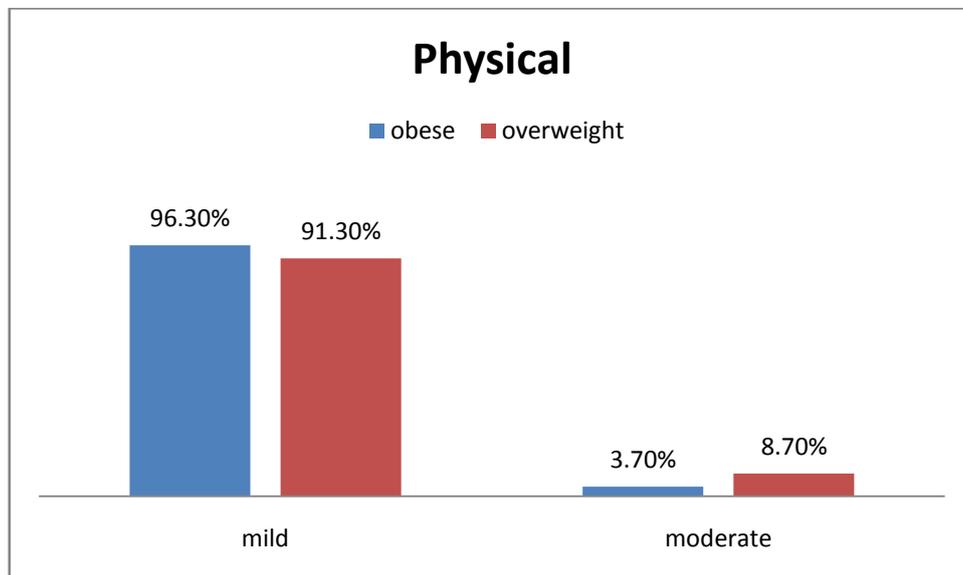




**Graph 5: BMI with vasomotor component of MENQOL**

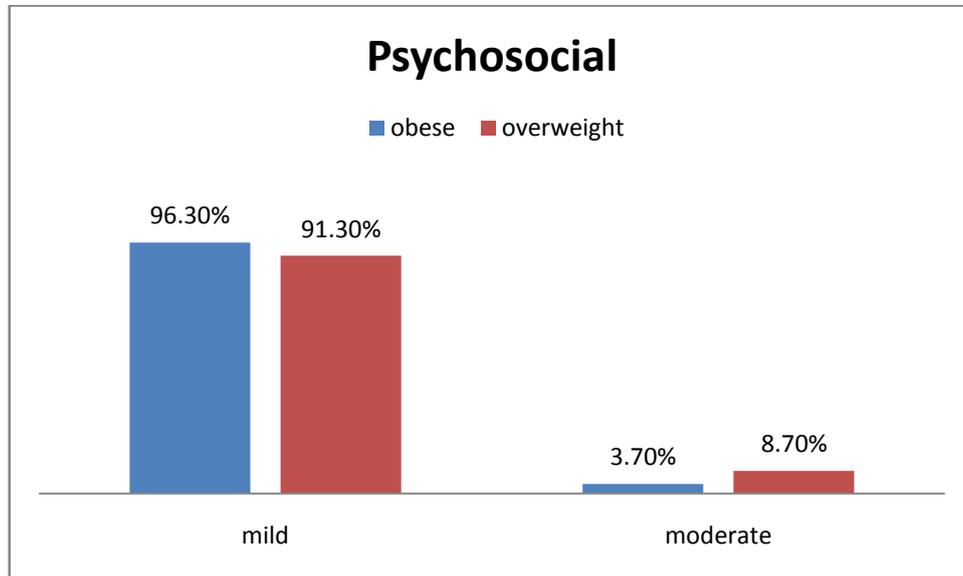


**Graph 6: BMI with physical component of MENQOL**

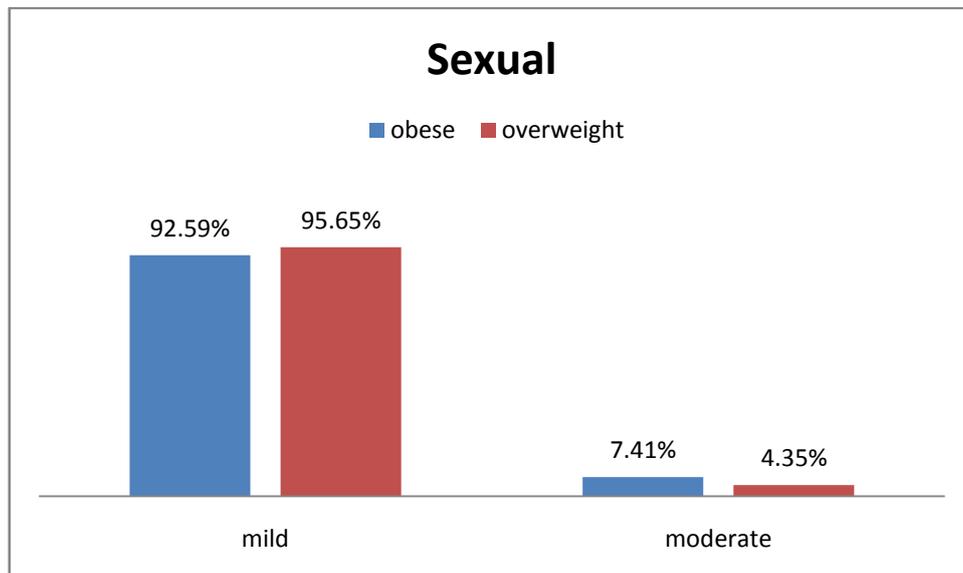




**Graph 7: BMI with psychosocial component of MENQOL**



**Graph 8: BMI with sexual component of MENQOL.**



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