CPQ Nutrition (2018) 3:1
Research Article

CIENT PERIODIQUE

Body Mass Index and Lipid Profile of Obese and Non-Obese Women in Shendi Area

Faroug Bakheit Mohamed Ahmed

Department of Biochemistry, Shendi University, Sudan

***Correspondence to:** Dr. Faroug Bakheit Mohamed Ahmed, Department of Biochemistry, Shendi University, Sudan.

Copyright

Received: 25 October 2018

Published: 10 December 2018

Keywords: *Anthropometry; Body Mass Index; Cholesterol; Triglyceride; Omega 3*

Abstract

This study was carried out at Shendi area, Sudan. The data were collected from 400 women their age range (18-50) years and grouped into obese and non-obese according to BMI. The study was designed to find out anthropometric measurements (height, weight and mass body index) and fatty biochemical investigations (total cholesterol and triglyceride) among the women. The study based on a questionnaire that contains some queries about age, nutrition type and diseases if they found. The study in some aspects focused on the comparison between the test group (obese women) and the control group (non-obese women) was also it studied the impact of some factors such as nutrition and the disease state on the whole group of the sample.

The study showed that there was a significant difference ($P<0.05$) for the mean of cholesterol and triglyceride concentration between the two groups where the values were higher in obese women. Also study revealed a clear rise in the level of cholesterol and triglycerides of the two groups with age ($P<0.05$). The study also represented that the source and nature of food has a clear effect on fatty measurements ($P<0.05$), where the highest values were for those who relied on meat as a primary source which it explained due to high percentage of cholesterol and saturated fatty acids

in red meats, while the lowest values for those whom had intake fish periodically, that may be attributed to presence of omega 3 fatty acids in fish oils.

Introduction

Obesity can be defined as a disease of extensive fat accumulation and body fat distribution to the extent that health and wellbeing are affected [1]. However, the degree of excess fat, its distribution within the body and obesity duration is associated with heath consequences vary between obese individuals [2]. Obesity is one of the leading preventable causes of death worldwide [3,4]. Large-scale American and European studies have found that mortality risk is lowest at a BMI of 20-25 kg/m^2 [5]. In the United States obesity is estimated to cause 111,909 to 365,000 deaths per year [6]. While 1 million (7.7%) of deaths in Europe are attributed to excess weight [7]. On average, obesity reduces life expectancy by six to seven years [8]. A BMI of 30-35 kg/m^2 reduces life expectancy by two to four years. While severe obesity (BMI > 40 kg/m^2) reduces life expectancy by ten years [5].

Obesity is a chronic disease conditioned by genetic, endocrine and environmental factors. Rapid body mass increments occur in young women who were overweight already in childhood [9]. Another high risk group is constituted by women who reported considerable body mass increments during the first pregnancy. However, the application of oral contraception had no significant influence on the body mass increase. The proportion of the population whose is obese increases steadily with each decade of life until about the age of 60 years in Western countries [10]. Ovarian dysfunction could be caused by weight loss and excessive weight gain with body mass index (BMI) greater than 27 kg/m^2 [11]. Excess weight has also been found to have effect on treatment efficacy and outcomes of assisted reproductive technique [12].

In 2013, the American Medical Association classified obesity as a disease. Usually BMI has been used as a measure to diagnose obesity. Other types of anthropometric measures like waist circumference, hip circumference, skin folds and waist to hip ratio (W/H) have all been associated with increased body fat and have predicted the distribution of body fat. International criteria for body mass index (BMI) suggest the following: Underweight (<18.5 kg/m^2), normal weight (18.5-24.9 kg/m^2), overweight (25 - 29.9 kg/m^2), and obesity (>30 kg/m^2) [13]. In addition in other classified severe obesity is (BMI > 40 kg/m^2) [5]. But the revised guidelines for diagnosis of obesity in Asian Indian populations are: A normal BMI of 18.0-22.9 kg/m^2, an overweight BMI of 23.0-24.9 kg/m^2 and obesity of BMI greater than or equal to 25 kg/m^2 [14].

Women had body mass index (BMI), overweight and abdominal obesity greater than men, and this could be explained by age, level of education, population group, ethnicity and area of residence [15]. Women with high waist circumference generally provided greater risk compared to those who are overweight and obese as well as those with android obesity [16]. Obesity is independently associated with a 4-fold increased risk of diabetes for women and 49.9% of the population attributable to the risks of diabetes due to obesity [17].

Baseline serum glucose, cholesterol, triglyceride, uric acid and blood pressure levels are usually higher in the upper body than is the case in peripheral obesity, and tend to decrease more in response to moderate weight loss [18]. Visceral obesity is closely linked to both insulin resistance and type 2 diabetes, Hypertension [19] and hypercholesterolemia [20]. Obesity that to android obesity with an increased risk of diabetes mellitus and cardiovascular disease [21] insulin resistance is present in 40-50% of patients, especially in obese women [22]. The present study aims to determine the women's anthropometric measurement (BMI), and total cholesterol and total triacylglycerol in Shendi area.

Materials and Methods

Subjects

This cross sectional study was conducted among women age ranging from 18 to 50 years in Shendi area. Participants were classified into two groups obese and non-obese based on International criteria for body mass index (BMI).

Study Methods

Questionnaire

Questionnaire was designed which included information about sample.

Anthropometric Measurements

From all study participators height and weight were measured and BMI was calculated through these procedures:

Height (Meter): Height was measured by using measuring tap in the standing position with normal sate and without shoes.

Weight (Kilogram): Scale was used to assess the body weight of subjects whom wearing light clothing and without shoes.

Body mass index (BMI) (Kg/m²): Was calculated using following formula

$$BMI(Kg/m^2) = \frac{Weight(Kg)}{Height(m^2)}$$

Proposed classification is BMI for [WHO] Class BMI (Kg/m²)
Underweight <18.5 kg/m²
Normal weight 18.5-24.9 kg/m²
Overweight 25-29.9 kg/m²
Obesity 30- 40 kg/m²
Severe obesity > 40

Lipids Investigation

To obtain good, realistic and more accurate results, the blood sample was taken after 8 hours fasting period. 3ml from patient's vein were collected and placed in preservative containing heparin, and then the blood samples serum will be separated by centrifuging blood for 10 minutes at 3000RPM. Then, will decanted into 5ml plain plastic tube, labeled with date, name, time of collection, identification number of the volunteer participating in this study and stored frozen at -4°C for analysis. By using colorimetric methods total cholesterol (T.C.) and total triglyceride (T.G.) measurements were determine.

Statistical Analysis

The data was analyzed by using Statistical Package for Social Sciences (SPSS); percentage, mean and standard deviation and p value were calculated.

Results

Table 1: *Body mass index of test and control group*

BMI	Test group %	Control group %
Under weight	-	14
Normal weight	-	86
Over weight	3	-
Obesity	88	-
Severe obesity	9	

Table 2: *Total cholesterol and triglyceride of obese and nonobese women*

Lipid profile	Test group	Control group	P value
T.C mg/dl	198.41±4.33	162.76±3.56	< 0.05
T.G. mg/dl	189.35±3.98	159.62±2.05	< 0.05

Table 3: *Total cholesterol and triglyceride of sample according to age*

Age group (year)	Obese		Non obese	
	T.C mg/dl	T.G. mg/dl	T.C mg/dl	T.G. mg/dl
Less than 18	150.43±2.03	68.82±1.48	50.81±1.16	54.51±1.88
18 - 34	156.22±1.65	114.20±1.09	139.58±1.76	132.42±2.02
35 -50	187.91±1.79	140.11±1.37	152.34±1.20	127.29±2.41
P value	< 0.05	< 0.05	< 0.05	< 0.05

Table 4: *Effect of nutrition on lipid profile*

Nutrition	T.C mg/dl	T.G mg/dl
Meats	201.18±2.34	193.42±1.63
Milk	164.13±1.22	135.21±139
Vegetable	133.54±1.12	103.72±1.98
Fish	120.78±1.06	78.58±1.77
P value	< 0.05	< 0.05

Table 5: *Influence of some diseases on lipid measurements*

Disease		T.C. mg/dl	T.G. mg/dl	P value
Diabetes mellitus	Yes	176.22±1.12	150.39±1.66	< 0.05
	No	148.43±1.14	133.74±1.40	
Hypertension	Yes	173.93±2.45	160.30±1.06	< 0.05
	No	145.80±1.65	126.29±1.67	
Hypothyroidism	Yes	169.23±1.07	131.13±1.11	< 0.05
	No	148.49±1.23	135.23±1.19	

Discussions

The study in shown that cholesterol and triacylglycerol levels were increased in obese women (test group) compared with non-obese women (control group) which were (198.41±4.33 and 159.35±3.98) and (162.76±3.56 and 159.62±2.05) for both groups respectively (Table 2). This may be due to the fact that weight gain produces the accumulation of fat, which in turn leads to more synthesis of very low density lipoprotein (VLDL) and low density lipoprotein (LDL) that is responsible of cholesterol concentration elevated in the blood.

From table 3 we noted that cholesterol and triglycerides concentration were higher in the elderly for both groups, that could be explained by the movement reduction with age progress, which makes difficult fat metabolism through decomposition pathway (lipolysis) and thus lead to fat accumulation, Also many diseases that appear with age go on result in hyperlipdemia such as low level of thyroid hormones secretion (hypothyroidism), weight gain (obesity), lack of exercise (drowsiness) and narrow arteries (hypertension).

The study (table 4) showed high cholesterol and triglycerides levels in those who dependant mainly in their nutrition on meat and dairy products because red meats, especially beef and sheep (the main source of meat in the study area) contains high percent of saturated fatty acids and cholesterol, also the milk contains a lot of saturated fat in the form of triglycerides, the higher the content of fat in milk can raise the levels of LDL cholesterol and excessive consumption causes an increase in the level of cholesterol in the blood. While those who depend on their nutrition on vegetables had low cholesterol and triglycerides, because vegetables

and fruits reduce bad cholesterol (LDL) such as that containing vitamins C and E which act as antioxidants source to reduce the harmful cholesterol LDL. The reminder percentage whom were ate fish at regular intervals had cholesterol and triglycerides at less levels, this might be explained due to that fish contain fatty acids, especially omega-3 fatty acids, which increase good cholesterol.

As shown in Table 5 the concentration of total cholesterol and triglycerides is high in people with diabetic disease especially more of them were type 1 diabetes, that because insulin intake sure to stimulate glycolysis pathway at the same time inhibit lipolysis, which leads to the accumulation of fat in the body. In addition the accumulation of sugars with defect in its metabolism, the body converts this sugar into fat through lipogenesis pathway, and as a result triglyceride and cholesterol levels elevate. The study revealed that the average concentration of cholesterol and triglyceride is higher in people with thyroid disease than non-infected people, because the thyroid gland is not able to produce sufficient hormones T_3 and T_4 and these hormones have a clear effect on fat metabolism, therefore absence or deficiency of these hormones may be lead to fat accumulation and then lipidemia so as cholesterol rise. In some people, high cholesterol level more than normal rate may be due to genetics causes, lifestyle or both. Genes provide to the body some cells that do not help to get rid of LDL effectively and properly. In addition to that the high density lipoprotein (HDL) secretion may be low because of genetic genes.

Conclusion

The study concludes that obese women had high cholesterol and triglycerides levels compared with non-obese women. The absence of athletic activities, the culture and nature of nutrition, age progression and some diseases have a clear effect on these measurements. Attention should be given to the regular sports, well-balanced nutrition and periodic investigations.

Bibliography

1. WHO (1997). Obesity preventing and managing the Global Epidemic, Report of a WHO Consultation (WHO Technical Report Series 894), Geneva.

2. Ishikawa-Takata, K., Ohta, T., Moritaki, K., Gotou, T. & Inoue, S. (2002). Obesity, weight change and risks for hypertension, diabetes and hypercholesterolemia in Japanese men. *Eur. J. Clin. Nutr., 56*(7), 601-607.

3. Barness, L. A., Opitz, J. M. & Gilbert-Barness, E. (2007). Obesity: genetic, molecular, and environmental aspects. *American Journal of Medical Genetics, 143A*(24), 3016-3034.

4. Fried, M., Hainer, V., Basdevant, A., Buchwald, H., Deitel, M., *et al.* (2007). Inter-disciplinary European guidelines on surgery of severe obesity. *Int. J. Obes. (Lond)., 31*(4), 569-577.

5. Mokdad, A. H., Marks, J. S., Stroup, D. F. & Gerberding, J. L. (2004). Actual causes of death in the United States, 2000. *JAMA., 291*(10), 1238-1245.

6. Whitlock, G., Lewington, S., Sherliker, P., Clarke, R. & Emberson, J. (2009). Body-mass index and cause specific mortality in 900000 adults: collaborative analyses of 57 prospective studies. *Lancet., 373*(9669), 1083-1096.

7. Allison, D. B., Fontaine, K. R., Manson, J. E., Stevens, J. & Van Itallie, T. B. (1999). Annual deaths attributable to obesity in the United States. *JAMA., 282*(16), 1530-1538.

8. Peeters, A., Barendregt, J. J., Willekens, F., Mackenbach, J. P., Al Mamun, A. & Bonneux, L. (2003). Obesity in adulthood and its consequences for life expectancy: A life-table analysis. *Annals of Internal Medicine., 138*(1), 24-32.

9. Ostrowska, L., Lech, M. M. & Karczewski, J. (2004). Identification of risk factors of obesity in premenopausal women. *Pol. Merkuriusz Lek., 17*(102), 603-607.

10. Hingorjo, M. R., Syed, S. & Qureshi, M. Q. (2009). Overweight and obesity in students of a Dental College of Karachi: lifestyle influence and measurement by an appropriate anthropometric index. *JPMA., 59*(8), 528-532.

11. Olooto, B., Wasiu, E., Amballi, A., Banjo & Taiwo, A. (2012). A review of Female Infertility; important etiological factors and management. *J. Microbiol. Biotech. Res., 2*(3), 379-385.

12. Freundl, G., Godehardt, E., Kern, P. A., Frank-Herrmann, P. & Koubenec, J. (2003). Hormones and behaviour. *Reprod., 18*(12), 2628-2633.

13. World Health Organization (1997). Report of a WHO consultation on obesity. *Preventing and managing the global epidemic,* Geneva: WHO.

14. Puoane, T., Steyn, K., Bradshaw, D., Laubscher, R., Fourie, J., Lambert, V. & Mbananga, N. (2002). Obesity in South Africa: the South African demographic and health survey. *Obes. Res., 10*(10), 1038-1048.

15. Perissinotto, E., Pisent, C., Sergi, G., Grigoletto, F. & Enzi, G. (2002). Anthropometric measurements in the elderly: age and gender differences. *British J. of Nutr., 87*(2), 177-186.

16. Tanchoco, C. C., Cruz, A. J., Duante, C. A. & Litonjua, A. D. (2003). Prevalence of metabolic syndrome among Filipino adults aged 20 years and over. *Asia Pac J Clin Nutr., 12*(3), 271-276.

17. Okosun, I. S. (2001). Racial differences in rates of type 2 diabetes in American women: how much is due to differences in overall adiposity? *Ethn. Health., 6*(1), 27-34.

18. Pasanisi, F., Contaldo F., de Simone, G. & Mancini, M. (2001). Benefits of sustained moderate weight loss in obesity. *Nutr. Metab. Cardiovasc Dis., 11*(6), 401-406.

19. Nyholm, B., Nielsen, M. F., Kristensen, K., Nielsen, S., Ostergard, T., *et al.* (2004). Evidence of increased visceral obesity and reduced physical fitness in healthy insulin-resistant first-degree relatives of type 2 diabetic patients. *Eur J Endocrinol., 150*(2), 207-214.

20. Ko, G. T., Chan, J. C. & Cockram, C. S. (1999). Age, body mass index and 2-hour plasma glucose are the major determinants of blood pressure in Chinese women newly diagnosed to have glucose intolerance. *Int. J. Cardiol., 69*(1), 33-39.

21. Wild, R. A. (1995). Obesity, lipids, cardiovascular risk, and androgen excess. *Am. J. Med., 98*(1A), 27-32.

22. Aral, S. D. & Cates, W. J. (1983). The increasing consent with infertility: Why now. *J.A.M.A., 250*(17), 2327-2331.