Comparative study of blood glucose levels in obese and non-obese individuals

Article · April 2017

CITATIONS
0

READS
30

4 authors, including:

Ramesh Babu
Sambhram Group of Institutions
3 PUBLICATIONS **1** CITATION
SEE PROFILE

Pravallika Pagadala
Sri Devaraj Urs Medical College
5 PUBLICATIONS **0** CITATIONS
SEE PROFILE

Comparative study of Blood Glucose levels in Obese and Non-Obese Individuals

Suresh Konakanchi[1], Ramesh Babu M[2], Pravallika Pagadala[3] and Parvathi[4]

[1]Department of Physiology, Sri Devaraj Medical College, Karnataka, [2]Department of Biochemistry

[3]Department of Physiology, Sambhram Institute of Medical Sciences and Research, Karnataka,

[4]Department of Physiology, SVIMS, Andhra Pradesh.

(Received: Mar 2017 Revised: Mar 2017 Accepted: Apr 2017)

Corresponding Author

Pravallika Pagadala. E-mail: *pravallikapagadala5@gmail.com*

ABSTRACT

Introduction and Aim: Obesity has become a leading global public health problem. It is one of the underlying causes of non-communicable chronic diseases like insulin resistant type 2 diabetes, stroke & certain cancers. Obesity has become one of the leading causes of morbidity & mortality in both developed & developing countries. The present study was aimed to compare blood glucose levels in obese & non-obese and to show that obese are more prone to developing Type-II diabetes mellitus.

Materials and Methods: 40 obese subjects with age & sex matched 40 non-obese subjects were chosen. Their venous blood samples were collected after 12 hrs of fasting &analyzed for FBS using glucose oxidase & peroxidase method.

Results: Result of the present study showed that obese have high blood glucose levels compared to non-obese.

Conclusion: Thereby proving that obese people are prone to develop Type-II diabetes mellitus.This is due to changes in body metabolism because of change in body fat distribution in obese people.

Key Words: blood glucose levels, obese, non-obese.

INTRODUCTION

Obesity is often defined as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired (1). Obese individuals not only differ in the amount of excess fat that they store but also in the regional distribution of that fat within the body. The accumulation of fat in the abdominal region has been described as the type of obesity that had the greatest risk for the health of the individuals (1). Obesity has become a leading global public health problem. Obesity is one of the underlying causes of non-communicable chronic diseases. It has become one of the leading causes of morbidity and mortality in both developed and developing countries (2). Prevalence of obesity has increased tremendously in Indians subsequent to the wave of industrialization and modernization (3). Studies have shown that obesity is linked with non-communicable disorders, including insulin resistance, type 2 diabetes mellitus, strokes and certain cancers (2). It is a potential cause of future health-related problems, including metabolic diseases.In most instances, the harmful impact of obesity was revealed by measuring increased levels of blood glucose (4). Elevated blood glucose indicates that the increasing risk of developing Type-II diabetes mellitus. Adipose tissue accumulation with triglyceride and free fatty acids, especially visceral and ectopic (intramuscular and hepatic), induces a spectrum of metabolic and hormonal changes, which progressively impair insulin signaling (5). These changes manifest as increased insulin resistance in the adipose tissue, liver, skeletal muscle and vascular endothelium which may lead to glucose intolerance (6). Based on the physiological novel techniques, blood glucose is determined to find the problem of obesity by clinicians (7). Thus, the present study was designed to determine the prevalence of obesity in adult male and female to assess the existence of metabolic risk factors in obese adults and suitably matched (non-obese) controls. In In the present study we tried to compare the blood glucose levels in obese and non-obese individuals, as well as to show that obese individuals are prone to developing Type-II diabetes mellitus compared to non-obese.

MATERIALS AND METHODS

Total 80 subjects of aging 30-60 years were included in the current study, among this 40 subjects are obese and 40 non-obese subjects inclusive of both male and female. Two groups were made, in GROUP-I obese 40 subjects (male-20 and female-20) and GROUP-II non-obese 40 subjects (male-20 and female-20).

Inclusion criteria:

- Obesity BMI > 25 kg/m^2
- Non-obesity BMI – 20-24.9 kg/m^2
- Age group between 30-60 years

Exclusion criteria:-

- Endocrine disorders like thyroid disorders
- Metabolic disorders like diabetes mellitus
- BMI < 18 kg/m^2
- Less than 30 And more than 60 years of age

Height and Weight were measured by measuring tape and weighing machine and they were expressed in cm and Kg respectively.

The Body Mass Index was calculated based on a person Height and Weight by using "Quetelets index"

(BMI = WEIGHT (kg)/HEIGHT (m^2))

Body Fat Percentage is measured by using a formula
BFP = (1.20 × BMI) + (0.23× Age) – (10.8 × Gender) – 5.4
Where male gender = 1, Female gender = 0

Measurement of Waist Circumference: The Waist circumference is measured at a level between the lowest rib and the iliac crest by using measuring tape.

Measurement of Hip Circumference: It is taken as the largest circumference around the buttocks by using measuring tape.

Sample collection: The subjects were instructed to attend the outpatient department at SVIMS, Tirupathi in the morning hours after 12hrs fasting. Venous blood samples were collected randomly from the Obese and non Obese subjects and allowed to clot for half an hour, following which the sample was centrifuged for 15 min and serum was separated and stored immediately at 50C until analysis.The serum sample was analyzed for FBS.

Estimation of Glucose: by Glucose oxidase and Peroxidase

Data analysis

SPSS version 11.5 was used for all statistical analysis. Groups with discrete variable were compared with chi square test. P-value <0.05 was taken as statistically significant.

RESULTS

In the Group-I and Group II subjects height, weight, body mass index, waist circumference, hip circumference, waist-hip ratio, body fat percentage, fasting blood sugar and lipid profile were measured. The statistically analyzed data was suitably arranged in tables. All these characteristics was compared between Group-I and Group-II.

Table-1: Statistical analysis of age, weight, height, BMI, WC, HC, WHR and body fat percentage in between Group I (obese) and Group II (non-obese)

S No	Characteristics	Obese n=40 Mean +/- SD	Non-obese n=40 Mean +/- SD	p value
1	Age	47.47 +/- 7.19	48.42 +/- 7.36	0.561
2	Weight	79 +/- 20.00	63.4 +/- 6.47	<0.0001 *
3	Height	158.77 +/- 9.17	163.75 +/- 7.36	<0.009 *
4	BMI (kg/m^2)	31.14 +/- 5.81	23.137 +/- 1.14	<0.0001 *
5	WC (cm)	101.32 +/- 14.39	80.675 +/- 6.26	<0.0001 *
6	HC (cm)	103.62 +/- 20.05	83.97 +/- 6.98	<0.0001*
7	WHR	0.96 +/- 0.09	0.958 +/- 0.03	0.480
8	Body fat percentage	37.05 +/- 8.43	27.75 +/- 5.54	<0.0001 *

BMI: Body mass index, WC: Waist circumference, HC: Hip circumference, WHR: Waist hip ratio*= significance p value.

This master chart showing the comparison of age, height, weight, BMI, WC, HC, WHR, body fat percentage in between Group I (obese) and Group II (non-obese) . There was significant (p value <0.05) results seen in the weight, height, BMI, WC, HC and body fat percentage except in WHR.

Table-2: Statistical analysis of FBS ratio in between Group I and Group II

S No	Characteristics	Obese n=40 Mean +/- SD	Non-obese n=40 Mean +/- SD	p value
1	FBS (mg/dl)	148.12 +/- 51.93	108.15 +/- 19.18	<0.0001*

FBS: Fasting blood sugar, *= significance p value.

This master chart is showing the comparison of FBS between Group I (obese) and Group II (non-obese). There was a significant result seen in the FBS it indicates that obese has high blood glucose levels when compared to non-obese.

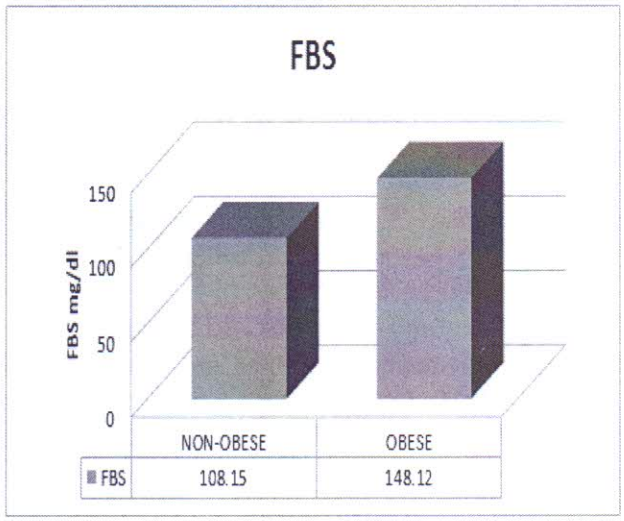
DISCUSSION

The current study was carried out to evaluate the blood glucose levels in obese and non-obese individuals and also to show that obese individuals are more prone to higher blood glucose levels.

According to Table 1, the significant p-value ($p< 0.001$) was drawn for the considered parameters like weight, BMI, WC, HC, body fat percentage and height ($P < 0.009$) except WHR in Group I (obese) compared with Group II (non-obese). Baksha et al. (2014) reported that the obesity is related to increase in parameters such as weight, BMI, WC, HC, WHR, and body fat percentage. Further, it was supported by Ismail ozkayaet al. (2014) who stated that the significant increase in the parameters resulted in obesity. The results are drawn from present study correlated with the reports suggested by Bakshaet al., and ozkayaet al. Thus, the degree of increase in parameters like weight, BMI, WC, HC, and body fat percentage will directly influence the change in blood pressure, blood glucose and lipid profile.

According to Table 2 and Figure 1, The fasting blood sugar shows significant change (<0.0001) in obese when compared with non-obese. Fava et al. (2015) conducted a study on the association of BMI with known CHD risk factors. This study included distribution of BMI in 3193 men and women subjects respectively, showed significance results in FBS. The results of present study correlate with the earlier study done by Fava, which resulted in attention towards increased FBS levels in obesity. The increased FBS levels may be due to ectopic accumulation of lipids in the muscles, liver and β-pancreatic cells, leading to insulin resistance. Free fatty acids are in competition with glucose for oxidation, suggesting that increased lipid oxidation generate insulin resistance in obesity along with a progressive increase in waist circumference, decreased HDL levels and increased triglycerides.

Figure-1: This bar diagram shows the comparison the mean value of FBS in between Group I(obese) and Group II(non-obese)



CONCLUSION

In the present study, highly significant levels in waist circumference, BMI, and body fat percentage were seen in obese people (Abdominal obesity was more closely related to metabolic dysfunctions connected with cardiovascular disease than was general obesity).Thus, changes in body fat distribution result in changes in body metabolisms which in turn cause the changes in blood glucose levels. An increased significant level of blood glucose may lead to various risk factors like diabetes, cancer, cardiovascular disease. Thus, the obesity is positively correlated with blood glucose levels. Diagnosis of obesity and the evaluation of the present study parameters will be highly useful to the clinicians the institute remedial measures at an early stage.Policies and programs can be formulated that focus on population-level intervention with regard to obesity prevention, such as those

sures at an early stage.Policies and programs can be formulated that focus on population-level intervention with regard to obesity prevention, such as those that promote public awareness about obesity and its causes, effects, complications and management.

Conflicts of Interests
We would like to convey our conflicts to the Dean of SVIMS, Professor and Heads of the Physiology, Biochemistry SVIMS, Tirupathi for their continuous help, support and encouragement to carry the study.

REFERENCES

1. Sorig, H., Ballal, A., and Saeed, A.M. Body fat distribution, lipid profile and fasting blood glucose level in young obese Sudanese females. Sudan Med J. 2009; 45: 40-48.
2. Omisorea, B., Omisoreb, A., and Abioye-Kuteyic, E. Obesity prevalence and metabolic differences between obese and non-obese school adolescents. S Afr Fam Pract. 2015; 1-5.
3. Amruta, A. Bakshi,Jayashree S. Bavikar, Shilpa B. Asegaonkar, Jayashree S. Bardapurkar,Vijay Domple, Pooja SK Raiet al,.Evaluation of Usefulness of Serum Insulin as Sensitive Predictor of Cardiovascular Dysfunction in Obese Individuals with Normal Lipid Profile. J Clin Diagn Res. 2014; 8: 10-12.
4. Olsen, N.J., and Heitmann, B.L. Intake of calorically sweetened beverages and obesity. Obes Rev. 2009; 10: 68-75.
5. Malik, V.S., Schulze, M.B., and HU, F.B . Intake of sugar sweetened beverages and weight gain; a systematic review. Am J Clin Nutr. 2006; 84: 274-288.
6. Tsigos, C., Bitzur, R., Kleinman, Y., Cohen, H., Cahn, A., Brambilla, G., et al., Targets for body fat, blood pressure, lipids, and glucose-lowering interventions in healthy older people. Diabetes Care. 2013; 36: 292-300.
7. Haslam, D.W., and James, W.P. Obesity.Lancet. 2005; 366: 1197-1209.
8. https://en.wikipedia.org/wiki/Obesity.
9. Haslam, D. Obesity: a medical history. Obes Rev. 2007; 8: 31-36.
10. Caballero, B. The global epidemic of obesity: an overview. Epidemiol Rev. 2007; 29: 1-5.
11. Obesity. NICE CKS. 2012(2).
12. Ozkaya, I., Bavunoglu, I., and Tunçkale, A. Body Mass Index and Waist Circumference Affect Lipid Parameters Negatively in Turkish Women American Journal of Public Health Research. 2014; 2: 226-231.
13. Caballero, B. Introduction. Symposium: Obesity in developing countries: biological and ecological factors. J Nutr. 2001; 13: 866-870.
14. Defronzo, R.A. International text book of diabetes mellitus. 3rd edition. 1: 567.
15. Netjasov, A.S., Vujovic, S., Ivovic, M., Tancic-Gajic, M., Marina, L., and Barac, M. Relationships between Obesity, Lipids and Fasting Glucose in the Menopause. SrpArhCelokLek. 2013; 141: 41-47.