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EFFECT OF OBESITY ON GLUCOSE LEVEL IN BLOOD

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Abstract:

Objective*: The study objective is to find relationship between body mass index and blood glucose level.* ***Methodology:*** *Study was conducted during the month of September 2017, on medical students of King Edward Medical University, Lahore. Study design is descriptive, cross sectional. The study population is male or female students of age group 18 to 24 years. Study sample was 166 students. Blood glucose level and BMI of all students was measured.* ***Results:*** *All students were within age group range of 17 to 24 years. The mean age was 19.1 ± 1.5 years. Mean body mass index was 24.6±6.1 and mean blood glucose level was 126.2±12.3 mg/dl. Pearson correlation test results were increased blood glucose level in persons with more BMI. This correlation was statistically significant, p-value 0.000, r=0.625.* ***Conclusion:*** *There was statistically significant correlation between body mass index and blood glucose level. Thus, hyperglycemia is more common amongst obese population than in non-obese. The relation between blood glucose and age was also statistically significant. However, there was statistically insignificant difference in blood glucose level of males and females.*

Key Words: *Body mass index (BMI), Blood glucose level (BSL), obesity, correlation.*

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INTRODUCTION:

Body mass index is measured by formula; weight in kilograms divided by height in square meters. According to WHO the BMI ranges for nutritional status assessment are:

Table: 1 BMI range.

BMI	interpretation
<15	Very Severely underweight
15 to 16	Severely underweight
16 to 18.5	underweight
18.5 to 25	normal
25 to 30	overweight
30 to 35	Moderately obese
35 to 40	Severely obese
>40	Very severely obese

The blood glucose level is altered by body mass index. This hypothesis was made and was tested on a population of 166 students to prove the hypothesis.

In a cross sectional study conducted by Sahin-Efe A, et al. in 2018 it was studied that leptin and irisin levels were higher in individuals with higher BMI, irrespective of their blood glucose levels. Thus it was concluded that both these factors were more in obese population but were not a cause of diabetes [1]. Effects of probiotics and synbiotics on blood glucose level was studied by Nikbakht E, et al in which it was concluded that probiotic and symbiotic supplementations lower the level of blood glucose in individuals who had higher serum glucose levels [2].

Steinarsson AO, et al. in a study covering 100,606 individuals from Swedish Diabetes register concluded that people who had higher BMI, suffered diabetes mellitus at younger age than those who had normal BMI or lower than normal BMI. Thus relation of BMI with altered glycemic control has been proved [3].

METHODOLGY:

Total 166 undergraduate medical students, doing bachelors of basic medical sciences (MBBS) were enrolled in study after taking informed written consent. The study was conducted at King Edward Medical University, Lahore during month of September, 2017. Students were randomly selected from different years. The age group was 18 to 24 years. The students who were suffering from any illness at the time of enrollment or during the study were excluded. BMI (body mass index) of all participants was measured.

No ethical issue certificate was obtained from research department of university. The purpose of study was elaborately informed to all the participants. The information was collected on a pre- designed questionnaire. History of DM and family history of diabetes mellitus was taken from all participants.

BMI was calculated by measuring weight in kilograms and height in meters square by using weighing machine and measuring tape. Random blood sugar level of all participants was measured. Samples were collected and sent to university laboratory. Results were obtained from laboratory within 24 hours.

Data was analysed by using SPSS 17. For age, BSL and BMI, mean and standard deviation of mean was calculated. For gender and family history of diabetes mellitus, frequencies were calculated. To assess the correlation between BMI and blood glucose level, Pearson correlation test was applied. Post stratification student t test was applied after stratification of age, gender and BMI, the relation between these variables and blood glucose level was measured. P value less than 0.05 was marked statistically significant.

RESULTS:

Total 166 participants were enrolled. The age group was from 18 years to 24 years. The mean age was 19.1±1.5 years. Mean BMI was 24.6±6.1 kg/m^2. Mean blood glucose level was 126.2±25.5 mg/dl. The positive correlation was found between blood glucose level and BMI on applying Pearson correlation test, which was statistically significant (r= 0.625, p=0.000).

All participants were stratified into two age groups. Group A with 18 to 20 years while group B with 21 to 24 years. 160 students were from group A while remaining 6 from group B. In group A, mean blood glucose level was 126.9±25.6 mg/dl. In group B, mean blood glucose level was 106.3±9.2 mg/dl. Statistically significant difference between both age groups was noted with P value of 0. 025.

There were 89 females and 77 males. Mean serum glucose level of all males was 128.6±26.2 mg/dl. In females mean serum glucose level was 124.1±24.9 mg/dl. This difference in mean blood glucose level between both genders was statistically insignificant. P value was 0.714.

Family history of diabetes mellitus was positive in 91 students while 75 students had no family history of diabetes mellitus. Mean blood glucose level was 124.2±25 mg/dl in those with positive family history

of diabetes mellitus and was 128.6±25 mg/dl in those without family history of diabetes mellitus. The difference between these two groups was statistically insignificant. P value was 0.813.

Table 2: Correlation between BMI and BSL

	Blood glucose level	
	Pearson correlation	P value
Body mass index (kg/m^2)	0.254	0.009

Table 3: comparison of BSL with age groups

Age group in years	n	Mean	SD of mean	P value
18 to 20	160	126.9	25.6	0.025
21 to 24	6	106.3	9.2	0.025

Table 4: Comparison of BSL with gender.

gender	n	mean	SD of mean	P value
females	89	124.1	24.9	0.714
males	77	128.6	24.9	0.714

Table 5: comparison of mean BSL with family history of DM

Family history of DM	n	mean	SD of mean	P value
yes	91	124.2	25.50	0.813
no	75	128.6	25.59	0.813

DISCUSSION:

Blood sugar levels depend on body mass index. Obesity is considered one of the risk factors for diabetes mellitus. In type 2 diabetes mellitus the first line recommended treatment option is exercise and weight reduction. The study aims in proving abovementioned hypothesis in order to determine the effectiveness of weight reduction on the diabetes control.

The role of exercise on reduced rate of gestational diabetes was studied by Yu Y, et al. in which six RCTs covering population of 2164 pregnant females were studied. Control intervention was compared with exercise intervention and it was observed that rate of gestational diabetes in exercise intervention was far less than the control intervention [4].

Obesity is not only associated with poor glycemic control but it is a major cause of cardiometabolic diseases as well. Metabolic syndrome, hypertension, ischemic heart disease, strokes and diabetrs mellitus are the major diseases associated with weight gain [6, 7, 10]. Individuals who adopt healthy life style have better glycemic control than those living sedentary life. In a study conducted on patients suffering from type 1 diabetes mellitus it was observed that those individuals who exercise regularly and focus on their BMI status had better glycemic control than those who just relied on glucose lowering drugs [5,9].

Excessive use of sugar sweetened beverages lead to weigh gain and higher blood glucose levels, the results were obtained from a study conducted on children in 7 to 12 years age group by Baoting He, et al [7]. A cardiovascular diseases risk is much higher in patients suffering from type 2 diabetes mellitus. The weight reduction strategies by opting healthy eating habits lead to lower cardiometabolic disease complications in diabetic patients. Thus weight loss not only helps in lowering blood sugar level but also it decreases the incidence of complications associated with diabetes mellitus [8].

CONCLUSION:

There was statistically significant correlation between body mass index and blood glucose level. Thus, hyperglycemia is more common amongst obese population than in non-obese. The relation between blood glucose and age was also statistically

significant. However, there was statistically insignificant difference in blood glucose level of males and females.

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