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THE RELATIONSHIP BETWEEN OBESITY AND SERUM ALBUMIN LEVELS IN ADULTS WITHOUT LIVER OR KIDNEY DYSFUNCTION

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Abstract

Objective: The objective of this study is to investigate the potential correlation between blood albumin levels and health complications associated with obesity in persons without any liver or kidney disorders.

Methodology: This study employed a cross-sectional design, using a sample of 160 individuals aged between 25 and 80 years. All participants were of the same gender. The participants were categorized into three distinct categories based on their body mass index (BMI): individuals with a healthy weight, overweight, and obese. Information was obtained regarding the individual's medical history, which may include a diagnosis of type 2 diabetes, physical ailments, and previous substance abuse. Venous blood samples were collected from the patient in order to determine the concentration of serum albumin. The study utilized SPSS 26.0 software to examine the correlation between hypoalbuminemia and obesity.

Results: Our study found no significant differences in the mean ages or gender distribution among normal-weight, overweight, and obese groups, with P-values of 0.125 and 0.172, respectively. While individuals in higher weight categories had a greater likelihood of developing diabetes, this difference was not statistically significant (P = 0.072). However, the prevalence of hypoalbuminemia was significantly higher in the overweight (29.8%) and obese (44.7%) groups compared to the normal-weight group (12.3%), with a P-value of 0.005. Additionally, median serum albumin levels were significantly lower in the overweight and obese groups compared to the normal-weight group (P < 0.001), indicating a strong association between increased body weight and reduced albumin levels.

Conclusion: The study reveals a substantial correlation between low blood albumin levels and being overweight. It is essential to accurately evaluate blood albumin levels in obese individuals to address

obesity and provide effective nutrition management. Achieving a comprehensive global consensus on evaluation standards is crucial for these efforts, emphasizing the need for international cooperation and standardized guidelines in managing obesity-related hypoalbuminemia.

Keywords: Hypoalbuminemia, Serum Albumin, BMI, Obesity

Introduction

In most cases, the accumulation of large amounts of adipose tissue is the root cause of obesity, which is a global health concern.[1] It has been reported to be associated with a greater death rate in addition to a wide variety of other health issues. Individuals who are obese have a significant accumulation of adipose tissue in their bodies.[2]

The body mass index, also known as BMI, is a metric that is occasionally utilized to categorize individuals into various groups based on the degree to which they are obese or have a high body fat percentage.[3] Having a body mass index (BMI) that is greater than 30 kilograms per square meter is the defining characteristic of obesity. It is estimated that approximately half of the adult population around the globe is either overweight or obese. Recent shifts in eating habits and the growing frequency of sedentary lifestyles are the primary factors that have contributed to this phenomenon.[4-5]Because obesity plays such a significant role in the development of cardiovascular illnesses, type 2 diabetes, and other metabolic disorders, it is a source of significant concern in the field of public health.[6] When it comes to health diseases that might have an effect on an individual, there are two distinct categories of conditions: cardiovascular disorders and metabolic ailments.[7] The management and elimination of obesity are of the utmost importance because it is a significant problem.[8]

In spite of the fact that obesity is becoming more prevalent all over the world, it is still extremely important to have a comprehensive understanding of the influences that obesity has on blood albumin levels. As a result of the critical role that serum albumin levels play in evaluating a wide range of health problems, it is of the utmost importance to have a comprehensive understanding of the impact that obesity has on these levels.

Aim

The aim of this study was to examine the possible association between obesity and increased levels of albumin in the blood among healthy persons without any renal or liver conditions.

Materials and Methods

Study Design: This observational study was conducted at Hayatabad Medical Complex Peshawar, Pakistan in the duration from November, 2023 to May, 2024.

Participants: A total of 160 people took part in the research trial. Participants who took part were adults between the ages of 25 and 80, and they did not have any problems with their livers or kidneys. The body mass index (BMI) of the participants was used to classify them into one of three categories: having a normal weight (18.5-24.9 kg/m2), being overweight (25-29.9 kg/m2), or being obese (>30 kg/m2).

Data Collection: The demographic statistics, medical history, and the number of prescriptions taken into account were all taken into consideration. For the goal of determining the levels of serum albumin, blood samples were taken from the veins of the patient. An investigation into whether or not there is a connection between being overweight and having low levels of albumin was carried out by means of a statistical analysis that was carried out with SPSS 26.0. For the purpose of descriptive analysis, chi-square test was utilized with a p-value of <0.05 set as significant.

Results

Table 1 summarizes the demographic characteristics of 160 participants divided into three groups: normal-weight, overweight, and obese. The mean ages for these groups are 44.5 ± 14.1, 47.3 ± 13.6,

and 50.8 ± 15.4 years, respectively, with similar age ranges. The gender distribution is relatively balanced, though there are slightly more males in the overweight and obese groups. Statistical analysis shows no significant differences in age or gender distribution across the groups, as indicated by the P-values (0.125 for age and 0.172 for gender).

Table 1: Age and Gender Distribution

Group	Mean Age (years)	Age Range (years)	Gender		Total (n=160)
			Male	Female	
Normal-weight	44.5 ± 14.1	25-75	27 (16.8%)	28 (17.5%)	55 (34.4%)
Overweight	47.3 ± 13.6	26-78	30 (18.8%)	26 (16.3%)	56 (35%)
Obese	50.8 ± 15.4	28-80	32 (20%)	17 (10.6%)	49 (30.6%)
P-value	0.125	-	0.172		-

Table 2 displays, by weight/BMI status, the diabetes prevalence among individuals. 11 of the 55 normal-weight individuals had diabetes (21.1%). 20 out of the 56 overweight participants (35.4%) have diabetes. Out of 49 members in the obese category, 25 have diabetes (50.6%). With a P-value of 0.072, the variations in diabetes prevalence among the groups are not statistically significant.

Table 2: Diabetes Prevalence

Group	Total Participants	Participants with Diabetes	Prevalence (%)
Normal-weight	55	11	21.1
Overweight	56	20	35.4
Obese	49	25	50.6
P-value	-	-	0.072

Table 3 lists, by weight/BMI status, the frequency of hypoalbuminemia among participants. Of the 55 members in the normal-weight group, 7—or 12.3%—have hypoalbuminemia. Whereas in the obese group 22 out of 49 participants (44.7%) have hypoalbuminemia, in the overweight group 17 out of 56 participants (29.8%) are affected. With a P-value of 0.005 the variations in hypoalbuminemia frequency among these categories are statistically significant.

Table 3: Hypoalbuminemia Prevalence

Group	Total Participants	Participants with Hypoalbuminemia	Prevalence (%)
Normal-weight	55	7	12.3
Overweight	56	17	29.8
Obese	49	22	44.7
P-value	-	-	0.005

Table 4 shows the Weight-categorized participants' median albumin values and interquartile ranges. The normal-weight group has a median albumin level of 4.3 g/dL (IQR: 4.0-4.5), the overweight group 3.9, and the obese group 3.5. These albumin differences across groups are statistically significant (P-value < 0.001).

Table 4: Median Serum Albumin Levels

Group	Median Albumin Level (g/dL)	Interquartile Range (g/dL)
Normal-weight	4.3	4.0-4.5
Overweight	3.9	3.6-4.2
Obese	3.5	3.2-3.9
P-value	< 0.001	-

Discussion

Our study highlights several key findings regarding the relationship between obesity and hypoalbuminemia. The prevalence of hypoalbuminemia is significantly higher in obese individuals (44.7%) compared to overweight (29.8%) and normal-weight (12.3%) participants, with a P-value of 0.005 indicating statistical significance. Additionally, the median albumin levels show notable differences across weight categories. The normal-weight group exhibits the highest median albumin levels at 4.3 g/dL, followed by the overweight group at 3.9 g/dL, and the obese group at 3.5 g/dL. These differences are statistically significant with a P-value of less than 0.001. While the prevalence of diabetes is higher in overweight and obese groups, these differences are not statistically significant (P = 0.072), indicating that diabetes alone does not explain the variation in hypoalbuminemia.

Our results align with previous research demonstrating a negative correlation between obesity and albumin levels. For instance, studies by Mosli et al. and Mun et al. identified similar trends, emphasizing that higher BMI is associated with lower albumin levels.[9-10] However, our study expands on these findings by including a non-diabetic control group, thus providing a broader context and highlighting the impact of obesity on hypoalbuminemia beyond diabetic populations.

Furthermore, our findings corroborate those of a study by Brock et al., which reported a high prevalence of hypoalbuminemia among hospitalized overweight and obese elderly individuals.[11] Unlike Brock et al., our study specifically highlights the differences in albumin levels among normal-weight, overweight, and obese groups in a non-hospitalized setting. This broader approach underscores the significance of hypoalbuminemia in the general population of obese individuals, not just those in clinical settings.

Overall, our study supports the notion that obesity is associated with hypoalbuminemia, potentially due to chronic inflammation and altered protein metabolism. This highlights the importance of monitoring albumin levels in obese individuals to improve health outcomes, as suggested by previous research, including Wiedermann et al. and Maqsood et al.[12-13] Understanding the complex interplay between obesity, inflammation, and protein metabolism is crucial for addressing the broader health implications of obesity-related hypoalbuminemia.

Conclusion:

The study reveals a substantial correlation between low blood albumin levels and being overweight. It is essential to accurately evaluate blood albumin levels in obese individuals to address obesity and provide effective nutrition management. Achieving a comprehensive global consensus on evaluation standards is crucial for these efforts, emphasizing the need for international cooperation and standardized guidelines in managing obesity-related hypoalbuminemia.

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