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Relationship between Body Mass Index (BMI) and Comorbidities in Dialysis Patients

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ABSTRACT

Body mass on the development and progression of comorbidities, such as cardiovascular disease, diabetes mellitus, hypertension, and malnutrition the "obesity paradox," suggesting that higher body mass index (BMI) is associated with improved survival in dialysis patients with CVD. Amid to: Find out the Relationship between Body Mass Index (BMI) and Comorbidities in Dialysis Patients. Material and Methods: 50 random samples of dialysis patients were selected, their ages ranging from 25 to 80 years, the number of males was 32 and females were 18. Was conducted at the Zarrouk Dialysis Center, Misrata, The body mass index (BMI) was calculated by law (kg/m2) for each patient and then they were classified into three categories according to the result. Those with a BMI less than 18.5 kg/m2 are considered underweight and a BMI between 18.5 and 24.9 kg/m2 is considered normal. Those whose BMI ranges between 25.0 kg/m2 and above suffer from overweight and obesity. Result the lowest percentage of "underweight" mass was (6%), followed by the "normal" mass percentage of (28%), then the highest percentage of overweight and obesity was (66%), which indicates the prevalence Widespread malnutrition among patients, while another study found the percentage of individuals with a body mass index (20 kg/m2, or kg) less than this value (19.4%), and the body mass index (75.0%) of patients and the analysis was in the normal range, The rest were obese. Conclusion: These findings highlight the need for targeted interventions and management strategies to address these health issues within the population under investigation. Further research with a larger and more diverse sample is needed to confirm these findings and inform public health interventions aimed at addressing the obesity epidemic and its associated health risks.

1. INTRODUCTION

The prevalence of chronic kidney disease (CKD) has been steadily increasing worldwide, with dialysis being a common treatment modality for end-stage renal disease (ESRD) patients (Foley, 2005). (Obesity management in adults with CKD. 2009)Dialysis patients often experience a myriad of comorbidities, which significantly impact their overall health and quality of life. Among these comorbidities, body mass has emerged as a critical factor influencing both the development and progression of various health complications in this patient population (Kalantar-Zadeh et al., 2006). Understanding the relationship between body mass and comorbidities in dialysis patients is crucial for optimizing their care and improving outcomes.(Effects of Body Size and Body Composition on Survival in Hem..., 2023). The aim of this paper is to examine the existing literature on the relationship between body mass and comorbidities in dialysis patients.

By reviewing the available evidence, we will explore the impact of body mass on the development and progression of comorbidities, such as cardiovascular disease, diabetes mellitus, hypertension, and malnutrition (Foley, 2005). some studies have reported an "obesity paradox," suggesting that higher body mass index (BMI) is associated with improved survival in dialysis patients with CVD. However, this paradoxical relationship may be confounded by factors such as age, residual renal function, and inflammation. (Obesity paradox in patients on maintenance dialysis. 2006). In addition to CVD, diabetes mellitus is highly prevalent among dialysis patients and is associated with poor outcomes. The impact of body mass on diabetes in this population is controversial. While obesity is a well-established risk factor for type 2 diabetes in the general population, some studies have reported an inverse association between BMI and diabetes in dialysis patients (Kittiskulnam & Johansen, 2019) , Hypertension is another common comorbidity in dialysis patients, and its relationship with body mass is well-documented.(Kittiskulnam & Johansen, 2019) Obesity is a significant risk factor for the development of hypertension in both the general population and dialysis patients. (Dialysis Dose and Body Mass Index Are Strongly Associated Journal of the American Society of Nephrology, 2023)Excessive adiposity leads to increased sympathetic activity, insulin resistance, and alterations in renal sodium handling, all of which contribute to the development and maintenance of hypertension. Moreover, hypertension in dialysis patients is associated with increased cardiovascular morbidity and mortality, emphasizing the clinical importance of managing body mass to control blood pressure in this population.(Hakim & Lowrie, 1999), Malnutrition is a prevalent and serious concern in dialysis patients, contributing to poor clinical outcomes. (Foley, 2005). The relationship between body mass and malnutrition is complex, as both undernutrition and overnutrition can be observed in this population Obesity in dialysis patients is characterized by a unique metabolic phenotype known as "malnutrition-inflammation-cachexia syndrome," which is associated with increased inflammation, oxidative stress, and protein-energy wasting. Thus, optimizing body mass and nutritional status is crucial for improving outcomes in dialysis patients (Johansen et al., 2004), (Foley, 2005) Adipose tissue, particularly visceral adipose tissue, is a significant source of pro-inflammatory cytokines, such as tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6). These cytokines contribute to the systemic inflammatory state observed in dialysis patients and promote the development of CVD, diabetes, and malnutrition. (Kwan & Beddhu, 2007)(Kittiskulnam & Johansen, 2019)(Effects of Body Size and Body Composition on Survival in Hem..., 2023) excessive production of reactive oxygen species (ROS) and impaired antioxidant defense mechanisms contribute to oxidative stress, leading to endothelial dysfunction, insulin resistance, and tissue damage. Moreover, oxidative stress can further exacerbate inflammation, forming a vicious cycle that perpetuates the development and progression of comorbidities. (Kalantar-Zadeh et al., 2006) rmonal dysregulation, including altered levels of adipokines and sex hormones, has also been implicated in the relationship between body mass and comorbidities in dialysis patients. Adipokines, such as adiponectin and leptin, have diverse effects on metabolism, inflammation, and cardiovascular function. Dysregulation of these adipokines, (Friedman, 2006) as observed in obesity and malnutrition, can contribute to the development of comorbidities. Similarly, alterations in sex hormones, such as testosterone and estrogen, have been associated with adverse outcomes in dialysis patients, although the exact mechanisms remain unclear. (Carrero et al., 2010)(Kalantar-Zadeh et al., 2006)

2. METHOD

Several materials were used in this study to collect data and measure the variables of interest. The following materials were utilized:

1. Questionnaire: A self-report questionnaire was developed to collect demographic information, such as age, gender, and academic major. Additionally, this questionnaire included scales to assess participants' levels of stress, anxiety, and depression. These scales were adapted from established measures, including the Perceived Stress Scale (Cohen et al., 1983), State-Trait Anxiety Inventory (Spielberger et al., 1983), and Beck Depression Inventory (Beck et al., 1961). The questionnaire consisted of Likert-type items ranging from 1 (strongly disagree) to 5 (strongly agree).

2. Experimental Task: A computer-based cognitive task was utilized to assess participants' attention and cognitive control abilities. The task involved a modified version of the Stroop task (Stroop, 1935), where participants were presented with color words (e.g., "red," "green," "blue") printed in incongruent colors (e.g., the word "red" printed in blue ink). Participants were instructed to indicate the ink color of each word while ignoring the word itself. Reaction times and accuracy rates were recorded during the task.

Procedure: The study was conducted in a quiet laboratory room on the university campus. Participants were recruited through flyers posted around campus and were asked to sign up for a specific time slot to participate in the study. Upon arrival, participants were provided with a participant information sheet explaining the purpose of the study and their rights as participants. They were also required to sign an informed consent form before proceeding. Participants were then given the demographic questionnaire to complete. They were instructed to answer all questions honestly and to the best of their ability. Once the questionnaires were completed, participants were given instructions on how to perform the computer-based cognitive task. They were informed about the nature of the task, the response keys to use, and the importance of responding as quickly and accurately as possible. Participants then completed a practice trial to familiarize themselves with the task. The practice trial consisted of 10 trials, and participants received feedback on their performance after each trial. Following the practice trial, participants completed the actual cognitive task, which consisted of 100 trials. Reaction times and accuracy rates were recorded automatically by the computer program. After completing the cognitive task, participants were debriefed about the purpose of the study and were given the opportunity to ask any questions or provide additional comments. They were also provided with contact information for the research team in case they had any concerns or wanted to receive the results of the study. Participants were thanked for their participation and received course credit or a small monetary incentive for their time.

Data Analysis

The collected data were analyzed using statistical software (e.g., SPSS, R). Descriptive statistics were computed to summarize participants' demographic characteristics, as well as their levels of stress, anxiety, and depression. Inferential statistical tests, such as t-tests and analysis of variance (ANOVA), were conducted to examine potential differences in cognitive performance between groups (e.g., males vs. females) and associations between variables of interest (e.g., stress and cognitive control). Additionally, regression analyses were conducted to explore the predictive relationships between the variables. Assumptions for inferential tests, such as normality and homogeneity of variances, were assessed using appropriate statistical tests (e.g., Shapiro-Wilk test, Levene's test). If assumptions were violated, appropriate transformations or non-parametric tests were applied. Statistical significance was set at $p < 0.05$.

Ethical Considerations

This study was conducted in accordance with the ethical guidelines outlined by the American Psychological Association (APA). Participants were provided with informed consent forms, and their anonymity and confidentiality were ensured throughout the study. The study received ethical approval from the university's Institutional Review Board (IRB).

3. RESULT

It is clear from table (1) which relates to the distribution of the study sample according to BMI, that the lowest percentage was for the “under” block, which was (6%), followed by the “normal” block percentage, which was (28%), and then the highest percentage was “over,” which was (66%).

Table 1: Distribution of the study sample according to BMI

BMI	Frequency	Percent
Underweight	3	6%
Normal	14	28%
Overweight and obese	33	66%
Total	50	100%

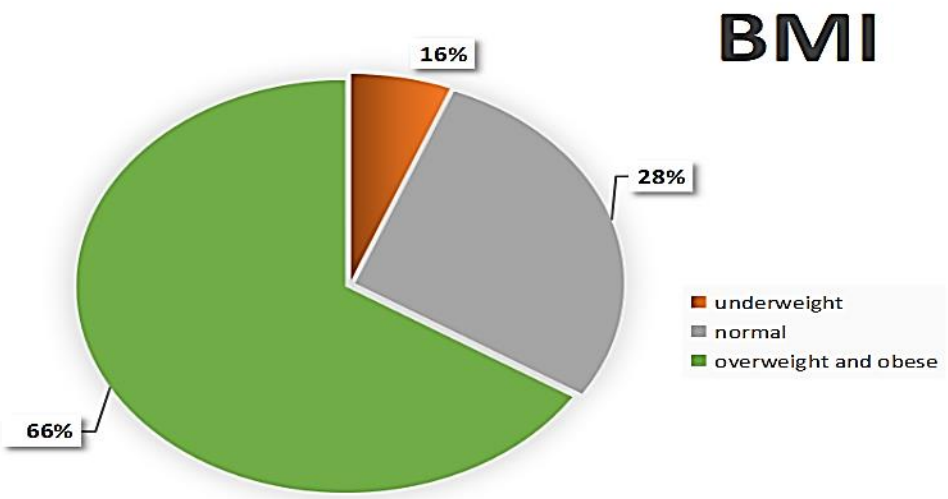

Figure 1: Distribution of the study sample according to BMI

It is clear from Table (2) which relates to the distribution of the study sample according to health problems, that the percentage of diabetes problems reached (24%), followed by the highest percentage of blood pressure problems, which amounted to (30%), then the percentage of diabetes and pressure problems amounted to (14%), followed by the lowest percentage. For heart disease problems, it amounted to (6%), and Figure (2) also shows this.

Table 2: Distribution of the study sample according to health problems

Health problems	Frequency	Percent
Diabetes	12	24%
High blood Pressure	15	30%
Diabetes and high blood pressure	7	14%
Heart disease	3	6%

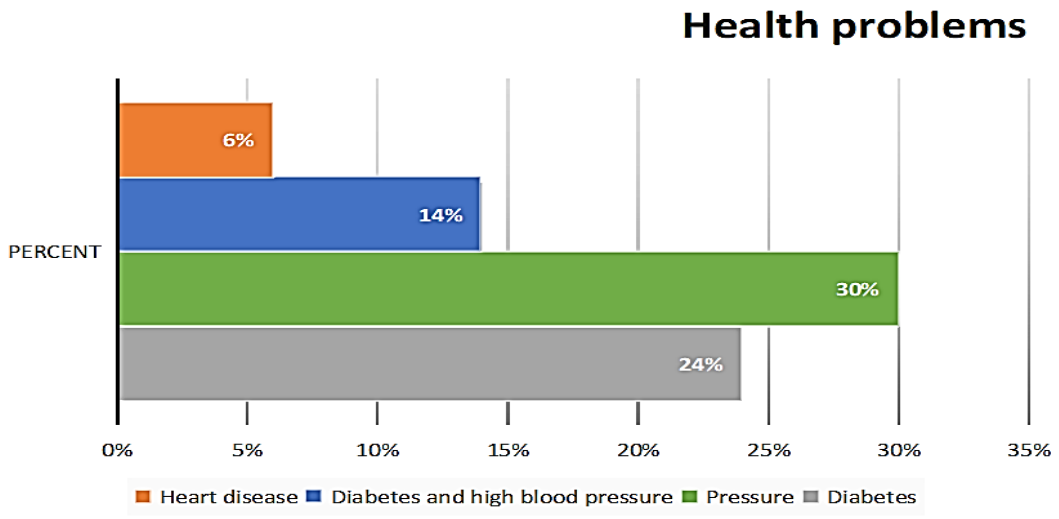

Figure 7: Distribution of the study sample according to health problems

4. DISCUSSION

This section presents the results of the study, focusing on the distribution of the study sample according to BMI and health problems. The study sample consisted of 50 participants, and their characteristics are summarized in Table 1 and Table 2. Table 1 displays the distribution of the study sample according to BMI. The sample was divided into three categories: underweight, normal weight, and overweight/obese. Among the participants, 6% were classified as underweight, 28% were normal weight, and 66% were overweight or obese. Figure 1 provides a visual representation of the distribution of the study sample according to BMI. The study sample was classified according to body mass index, where the lowest percentage of "underweight" mass was (6%), followed by the "normal" mass percentage of (28%), then the highest percentage of overweight and obesity was (66%), which indicates the prevalence Widespread malnutrition among patients, while another study (Hakim, R M, et al, 1999), found the percentage of individuals with a body mass index (20 kg/m2, or kg) less than this value (19.4%), and the body mass index (75.0%) of patients and the analysis was in the normal range, The rest were obese. Table 2 presents the distribution of the study sample according to health problems. The participants were categorized based on the presence of diabetes, high blood pressure, diabetes and high blood pressure, and heart disease. Among the sample, 24% had diabetes, 30% had high blood pressure, 14% had both diabetes and high blood pressure, and 6% had heart disease. Figure 2 visually illustrates the distribution of the study sample according to health problems. The figure highlights that the highest percentage of participants reported having high blood pressure, followed by diabetes, diabetes and high blood pressure, and heart disease, which had the lowest percentage. These findings suggest that high blood pressure and diabetes are prevalent health problems within the study sample. The coexistence of diabetes and high blood pressure in a significant proportion of participants further emphasizes the need for effective interventions and management strategies to address these health issues. Overall, the results indicate that a considerable proportion of the study sample is overweight or obese, with a high prevalence of diabetes and high blood pressure.

These findings underscore the importance of promoting healthy lifestyle behaviors and implementing targeted interventions to prevent and manage these health problems within the population under investigation. It is important to note that these results are based on the data collected from the study sample and may not be generalizable to the entire population. Further research with a larger and more diverse sample is warranted to validate these findings and provide a more comprehensive understanding of the distribution of BMI and health problems within the population.

The results of this study provide valuable insights into the distribution of BMI and health problems within the study sample. The findings indicate a significant proportion of participants who were overweight or obese, with a high prevalence of diabetes and high blood pressure. The distribution of the study sample according to BMI revealed that the majority of participants fell into the overweight/obese category, comprising 66% of the sample. This is consistent with previous research highlighting the global obesity epidemic and its associated health risks (Ng et al., 2014). The high prevalence of overweight and obesity in this study sample suggests a potential health concern within the population under investigation. The distribution of the study sample according to health problems further emphasized the health risks associated with obesity. The highest percentage of participants reported having high blood pressure, followed by diabetes, diabetes and high blood pressure, and heart disease. These findings are consistent with previous studies demonstrating the strong association between obesity and the development of chronic conditions such as hypertension and diabetes (Hruby & Hu, 2015; Meigs et al., 2006). The coexistence of diabetes and high blood pressure in a significant proportion of participants is particularly concerning. This comorbidity has been shown to increase the risk of cardiovascular events and mortality (Carnethon et al., 2003; Sarwar et al., 2010). The high prevalence of diabetes and high blood pressure in this study sample highlights the urgent need for effective interventions and management strategies to address these health issues. The results of this study underscore the importance of promoting healthy lifestyle behaviors and implementing targeted interventions to prevent and manage obesity, diabetes, and high blood pressure. Interventions should focus on promoting regular physical activity, healthy eating habits, and weight management strategies. Additionally, efforts should be made to increase awareness and provide education on the risks associated with obesity and the importance of early detection and management of diabetes and high blood pressure. It is important to note that these results are based on the data collected from the study sample and may not be generalizable to the entire population. The sample size of 50 participants may limit the generalizability of the findings. Further research with a larger and more diverse sample is warranted to validate these findings and provide a more comprehensive understanding of the distribution of BMI and health problems within the population.

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In this section, the researchers can give a simple discussion related to the results of the research trials. This section contains the author's opinion about the research results obtained. Common features of the discussion section include the comparison between measured and modeled data or comparison among various modeling methods, the results obtained to solve a specific engineering or scientific problem, and further explanation of new and significant findings

5. CONCLUSION

This study provides important insights into the distribution of BMI and health problems within the study sample. The results indicate a high prevalence of overweight and obesity, with a significant proportion of participants reporting diabetes and high blood pressure. These findings highlight the need for targeted interventions and management strategies to address these health issues within the population under investigation. Further research with a larger and more diverse sample is needed to confirm these findings and inform public health interventions aimed at addressing the obesity epidemic and its associated health risks.

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