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Natural Weight Management: Impact of Phaseolus Vulgaris on Biomarkers in Obesity and Prediabetes

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Abstract

Obesity and prediabetic is a global health concern, increasing the risk of chronic diseases and metabolic disorders. Recognized by the WHO and CDC as a major public health challenge, obesity is often linked to insulin resistance and prediabetes. Phaseolus vulgaris, commonly known as the common bean, has gained attention for its potential weight-management benefits due to its alpha-amylase inhibitors (Phaseolamin), which may reduce carbohydrate absorption. This study examines the impact of Phaseolus vulgaris supplementation on key metabolic biomarkers in individuals with obesity and prediabetes. A quantitative research design was employed, enrolling 100 participants, 50 in the experimental group and 50 in the control group—through purposive sampling. Participants received 1,500 mg of Phaseolus vulgaris powder or a placebo before meals for 30 days. Pre- and post-test evaluations included BMI, waist and hip circumference, blood pressure, and biochemical markers such as random blood sugar and lipid profile. The experimental group showed a significant reduction in BMI, from 29.93±2.08 to 29.23±2.06, with a mean difference of 0.70 ($t = 7.439$, $p<0.001$). A statistically significant reduction in hip circumference ($t = 6.803$) was also observed. These findings suggest that Phaseolus vulgaris supplementation may serve as an effective natural intervention for weight management and metabolic health, particularly in individuals seeking to regulate carbohydrate absorption and improve glycemic control.

Keywords: *BMI, Dietary Supplementation, Healthy Lifestyle, Obesity, Pre Diabetic, Phaseolus Vulgaris.*

Introduction

The rising burden of obesity is a threat to both developed and developing countries. Diabetes poses a complex metabolic issue that disturbs the body's management of glucose levels. Insufficient pancreatic synthesis of insulin or the body's incapacity to properly use the insulin that is generated are the two main causes of this illness [1]. The world health organization (WHO) estimated that more than1.9 billion adults (39% of men and 40% of women) aged 18 years and older were overweight in 2016 and of these over 650 million adults (11% of men and 15% of women) were obese [2]. Overweight and obesity are related to more deaths worldwide than underweight. The overweight and obesity states increase the risk of hypertension, type 2 diabetes, arthritis, sleep apnea, dyslipidemia, cardiovascular diseases, various types of cancer, and premature death. Overweight and obesity are related to more deaths worldwide than underweight. The overweight and obesity states increase the risk of hypertension, type 2 diabetes, arthritis, sleep apnea, dyslipidemia, cardiovascular diseases, various types of cancer, and premature death [3]. Phaseolus vulgaris, the common bean is a herbaceous annual plant grown worldwide for its edible dry seeds or green, unripe pods. Its leaf is also

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occasionally used as a vegetable and the straw as fodder. Its botanical classification, along with other Phaseolus species, is as a member of the legume family Fabaceae. Like most members of this family, common beans acquire the nitrogen they require through an association with rhizobia, which are nitrogen-fixing bacteria [4]. Food science researchers have investigated many plant-derived foods consumption for decreasing energy intake on both animal experiments and human studies, trying to offer a promising therapy to ameliorate obesity and its complication [5]. White kidney bean extract contains an amylase inhibitor. Amylase is an enzyme your digestive system uses to break down carbohydrates. White kidney bean extract blocks the actions of these enzymes, preventing the digestive system from breaking down the carbs for absorption. Regular consumption of PVE is also beneficial to prevention of diabetes and inversely associated with the risk type2 diabetes [6]. Dry beans and other high-fiber, low-fat meals can improve how successful diets for losing weight are. In six healthy participants, Leathwood and Pollet compared the effects of bean puree and potato puree on blood sugar levels and appetite [7].

Several studies shows that white kidney bean extract (Phaseolus vulgaris) is known for supporting weight loss, reducing carb absorption, assisting with starch blocking, which results in effort free weight management. This is 100% natural supplement is also a valuable source of dietary fibre and minerals for optimum health. Due to the obesity is the imbalance of energy intake and expenditure, effects of diet on body energy intake are one of obvious targets for intervention [8]. Food science researchers have investigated many plant-derived foods consumption for decreasing energy intake on both animal experiments and human studies, trying to offer a promising therapy to ameliorate obesity and its complication [9]. White kidney bean extract contains an amylase inhibitor. Amylase is an enzyme your digestive system uses to break down carbohydrates.[10]. White kidney bean extract blocks the actions of this enzyme, preventing the digestive system from breaking down the carbs for absorption. Regular consumption of PVE is also beneficial to prevention of diabetes and inversely associated with the risk type2 diabetes [11]. A study on conducted "Physiochemical characterization of Nuna bean (Phaseolus vulgaris) protein extract". In this study, the functional properities of a nuna bean protein extract using standard food analysis. It is resulted that Phaseolus vulgaris extract have high relevance as a weight loss supplement.[11] Studies show that purified PVE supplementation reduces postprandial glucose, insulin, c-peptide excursions, appetite, and suppressed ghrelin secretion in healthy human subjects [12]. One of the main consequences of obesity on health-related outcomes and the emergence of co-morbidities is obesity-induced oxidative stress [13]. Furthermore, oxidative stress is linked to obesity pathogens and is controlled by risk factors for obesity such food and the ingestion of bioactive substances [14]. So, the main objective of the study was to assess the effectiveness of phaseolus vulgaris supplementation on selected variable among client with pre diabetes and obesity at selected community setting.

Materials and Methods

A quantitative research design approach with one group pretest and posttest research design was used for the study. Before commencing the data collection, authorized setting permission was obtained from village president and the study was conducted. A total of 100 samples (control group 50 and experimental group 50) who met the inclusion criteria were selected as study participants by using a purposive sampling technique. The inclusion criteria for the study participants were clients who have a BMI classification of

overweight 25.5 to 29.5, clients who have hyperglycemia, clients who have high blood pressure (diastolic blood pressure between 90 mmHg and 100mmhg), and clients of both genders. The exclusion criteria include Clients who are clinically ill and non-cooperative. The purpose of the study was explained by the investigator to each of the study participants and a written consent was obtained.

Tool for Data Collection

The Tool Consists of Two Parts:

Part A

Demographic Variables such as:

1. Age
2. Gender
3. Educational qualification
4. Marital Status
5. Religion
6. Income
7. Type of work
8. Dietary Habits
9. Physical Activity

Part B

Bio markers such as:

1. BMI
2. RBS
3. lipid profile

Demographic variables and clinical variables were assessed by structured interview using structured questionnaires.

Intervention

The white kidney bean extract for 3/4 teaspoon (1,500 milligrams) once a day before meals with water for 30 days. Followed by post-test was conducted with the same tool.

Data Analysis

The data were analyzed by descriptive and inferential statistical methods using IBM SPSS version 22.0 software (IBM Corp., Armonk, NY, USA) statistical package.

Results

The calculated student independent 't' test value of t = 1.479 in the pretest shows that there was no statistically significant difference between the pretest level of BMI between the two groups. The calculated student independent 't' test value of t = 2.699 in the post test shows that there was statistically significant difference between the post test level of BMI between the two groups. This clearly shows that after administered with Phaseolus Vulgaris the BMI was significantly reduced among the clients with pre-diabetes and obesity in the experimental group than the clients in the control group who had routine protocol.

Table 1. Effectiveness of Phaseolus Vulgaris on BMI among Clients with Pre-diabetes and Obesity in the Experimental Group and Comparison in the Control Group. N = 100(50+50)

Group	**Pretest**		**Post Test**		**Mean Difference score**	**Paired 't' test & p-value**
	Mean	**S.D**	**Mean**	**S.D**		
Experimental Group	29.93	2.08	29.23	2.06	**0.70**	**t = 7.439 p=0.0001, S*** **
Control Group	30.57	2.24	30.45	2.42	0.12	t = 1.522 p=0.134, N.S
Mean Difference score	0.64		**1.22**		***p<0.001, **p<0.01 S – Significant N.S – Not Significant	
Student Independent 't' test value	t = 1.479 p=0.142 N.S		**t = 2.699 p=0.008 S****			

The table 2 depicts that the pretest mean score of RBS in the experimental group was 115.22±19.06 and post test mean score was 104.10±21.10. The mean difference score was 11.12. The calculated paired‘t’ test value of t = 5.008 was statistically significant at p<0.001 level. The calculated student independent’s test value of t = 2.718 in the post test shows that there was statistically significant difference between the post test level of RBS between the two groups. This clearly shows that after administered with Phaseolus Vulgaris the RBS was significantly reduced among the clients with pre-diabetes and obesity in the experimental group than the clients in the control group who had undergone hospital routine protocol.

Table 2. Effectiveness of Phaseolus Vulgaris on RBS among Clients with Pre-diabetes and Obesity in the Experimental Group and Comparison in the Control Group. N = 100(50+50)

Group	**Pretest**		**Post Test**		**Mean Difference score**	**Paired ‘t’ test & p-value**
	Mean	**S.D**	**Mean**	**S.D**		
Experimental Group	115.22	19.06	104.10	21.10	**11.12**	**t = 5.008 p=0.0001, S*** **
Control Group	115.40	19.02	115.00	18.93	0.40	t = 1.736 p=0.089, N.S
Mean Difference score	0.18		**10.90**		***p<0.001, **p<0.01 S – Significant N.S – Not Significant	
Student Independent ‘t’ test value	t = 0.047 p=0.962 N.S		**t = 2.718 p=0.008 S****			

Figure 1 depicts that the pretest mean score of Cholesterol in the experimental group was 178.50±25.39 and posttest mean score was 162.44±24.08. The mean difference score was 16.06. The calculated paired‘t’ test value of t = 19.309 was statistically significant at p<0.001 level.

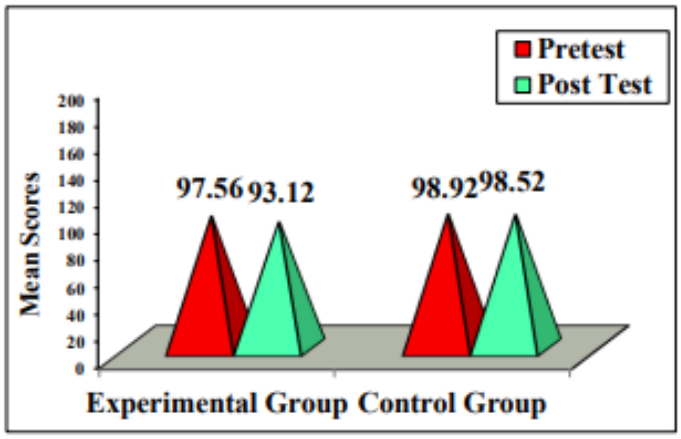

Figure 1. Effectiveness of Phaseolus Vulgaris on Waist Circumference among Clients with Pre-diabetes and Obesity in the Experimental Group and Comparison in the Control Group

Figure 2 depicts that the pretest mean score of Cholesterol in the experimental group was 178.50±25.39 and post test mean score was 162.44±24.08. The mean difference score was 16.06. The calculated paired ‘t’ test value of t = 19.309 was statistically significant at p<0.001 level.

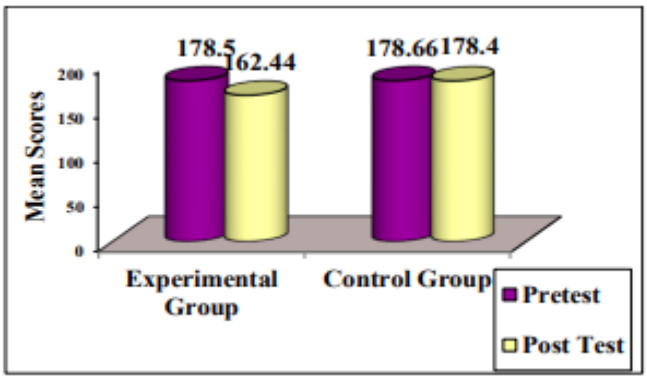

Figure 2. Comparison of Pretest and Posttest Level of Lipid Profile (Cholesterol) among Clients with Pre-diabetes and Obesity in the Experimental and Control Group

Discussion

Nowadays, diabetes mellitus has become common worldwide due to changes in lifestyle, sedentary habits, alterations in food choices, and various genetic and environmental factors [15]. Modern lifestyles, genetic predispositions, and nutritional overload through high-fat, energy-dense diets significantly contribute to the rising prevalence of diabetes and its related complications, primarily through obesity, which severely impacts metabolic health [16]. Individuals with prediabetes frequently develop chronic kidney disease (CKD), often going undetected due to the lack of overt symptoms. Elevated blood glucose levels can damage kidney function even before the onset of overt diabetes. Our findings indicate that administering 1,500 mg of Phaseolus vulgaris extract significantly reduced body weight and improved lipid profiles among 50 women who received the intervention. This aligns with a study by Udani et al., where obese adults consuming the same dosage twice daily over eight weeks showed reductions in both body weight and serum triglycerides [17]. A significant decrease in body mass index (BMI), a widely accepted indicator of obesity-related health risks, was also noted. A BMI between 20 and 25 is considered the lowest-risk category, while individuals with a BMI over 40 fall into the highest-risk category [17].

The prevalence of uncontrolled diabetes in our findings parallels national data from India (Borgharkar & Das, 2019) [18]. In support of this, Leonardo Cellino et al. reported that participants consuming Phaseolus vulgaris extract along with a carbohydrate-rich diet (2,000–2,200 kcal/day) for 30 days experienced significant reductions ($p < 0.01$) in body weight, BMI, fat mass, adipose tissue thickness, and body circumferences when compared to a placebo group [19]. Castillo et al. further highlighted the physicochemical properties of Nuna bean protein extract, validating its role in weight-loss interventions [20]. Sowmya Shree S. et al. (2023) emphasized that diabetes mellitus is a chronic metabolic disease that affects global populations and is often triggered by chronic high-fat intake leading to insulin resistance. Hyperglycemia also disrupts lipid and carbohydrate metabolism, worsening metabolic outcomes [21]. Additionally, Suganya et al. (2024) found a strong association between BMI, dietary intake, and self-care practices among postpartum mothers, indicating that health behaviors play a crucial role in managing metabolic conditions [22]. In terms of dietary and lifestyle modifications, Tamilselvi et al. (2024) demonstrated that effective IEC materials significantly improved knowledge and dietary practices among hypertensive clients, reinforcing the need for

education-based interventions [22]. Likewise, Sridevi et al. (2024) showed that Allium sativum (garlic) supplementation led to beneficial changes in biochemical parameters in hypertensive patients, which is particularly relevant given the metabolic overlap between hypertension and diabetes [23]. Furthermore, Suganya, et al. (2025) documented the successful management of proliferative diabetic retinopathy in an elderly female, illustrating the complex clinical outcomes of poorly managed diabetes and the importance of early dietary and lifestyle interventions [24].

Conclusion

The findings indicate that community-based interventions, including targeted dietary guidance on Phaseolus vulgaris supplementation and recommendations for physical activity, played a key role in maintaining a healthy BMI, blood pressure, random blood sugar (RBS), and lipid profiles among participants in the experimental group. The observed improvements in lipid profiles align with positive changes in glycemic control and body measurements. This underscores the importance of a holistic approach to managing prediabetes and obesity**,** addressing multiple risk factors simultaneously to achieve comprehensive health benefits.

Ethical Consideration

The study protocol was approved by The Institutional Scientific Review Board under the Saveetha College of Nursing (006/02/2023/ISRB/SCON) dated 05th February-2023). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Conflicts of Interest

Authors declare no conflicts of interest.

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