



## Original Article



# Association Between Plant-Based Dietary Intake and Anthropometric Measurements

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## ARTICLE INFO

### Keywords:

Plant-Based Diet, Dietary Intake, Nutritional Status, Anthropometric

### How to Cite:

Bashir, T., Mehmood, A., & Nazeer, R. (2025). Association Between Plant-Based Dietary Intake and Anthropometric Measurements: Plant-Based Dietary Intake and Anthropometric Measurements. *DIET FACTOR (Journal of Nutritional and Food Sciences)*, 6(3), 18-21. <https://doi.org/10.54393/df.v6i3.188>

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Received Date: 16<sup>th</sup> July, 2025

Revised Date: 13<sup>th</sup> September, 2025

Acceptance Date: 20<sup>th</sup> September, 2025

Published Date: 30<sup>th</sup> September, 2025

## ABSTRACT

The benefits of plant-based diets in enhancing health and lowering the risk of chronic illnesses are becoming more widely acknowledged. **Objectives:** To establish a correlation between a plant-based dietary intake and anthropometric measurements among adults. **Methods:** This cross-sectional study was conducted on 200 adults (20–50 years old) from community centers in Lahore. The validated food frequency questionnaire was used to measure dietary intake of foods. Anthropometric Indicators were measured. Groups of participants were organized according to how much or how little they consume plant-based foods. SPSS version 26.0 was used to analyze the data, and independent t-tests were used for comparison. **Results:** Among 200 participants, 55% consumed legumes three or more times per week, 40% had three or more servings of whole grains daily, 70% consumed at least two servings of vegetables per day, and 65% had three or more servings of fruit daily. **Conclusions:** Individuals with higher intake of plant-based foods had significantly lower waist-to-hip ratio, body mass index, and lower waist circumference than those with lower intake.

## INTRODUCTION

Plant diets have been noted to have the capacity to enhance health and prevent chronic illnesses [1, 2]. These diets contain large amounts of essential nutrients, fiber, and bioactive compounds, which help to achieve better nutritional status and decrease the risk of developing many health conditions [3, 4]. Diet is very important in preserving human health and in the prevention of chronic diseases. There is growing evidence that plant-based diets are a source of necessary nutrients, bioactive compounds, and antioxidants that promote metabolic health, weight control, and disease prevention [5, 6]. Studies have shown

that dietary patterns that involve following vegan-based diets are linked to healthy results. To illustrate, it has been found that people who adhere to plant-based diets are likely to be less fat, experience lowered blood pressure, and have better lipid profiles [7–9]. Moreover, Plant-based diets have been linked to decreased levels of inflammation and oxidative stress, which has been attributed to the development of chronic diseases [10, 11]. Although these advantages exist, nutritional trends in most communities have been moving to high consumption of processed and animal-based food products, and many studies are needed



regarding the impact of plant-based diets [12, 13]. To help guide dietary recommendations for the local population, this study examines the relationship between plant-based food intake and health indicators. There is currently little data on how plant-based diets affect nutritional and anthropometric indicators in Pakistani adults.

This study aims to establish a correlation between a plant-based dietary intake and anthropometric measurements among adults.

## METHODS

This analytical cross-sectional study was conducted on 200 adults aged 20–50 years to analyze the association between plant-based dietary intake and anthropometric measurements. The study was conducted for 5 months from May 2024 to September 2024. Participants were recruited using a convenience sampling method from multiple community centers located in urban areas of Lahore, Pakistan. This non-probability sampling approach was chosen for practicality, though it may limit the generalizability of the findings. A sample size of 200 was used for this study. A post-hoc power analysis was conducted using G\*Power software, which indicated that this sample size provided over 80% power to detect a medium effect size ( $d=0.4$ ) in the independent t-test comparisons of anthropometric measures between the high and low plant-based diet groups, assuming a two-tailed alpha of 0.05. Participants were recruited from multiple community centers located in urban areas of Lahore, Pakistan. Participants were categorized into 'high' or 'low' plant-based diet intake groups based on a composite score derived from the food frequency questionnaire. The score was calculated from the sum of weekly servings of fruits, vegetables, whole grains, and legumes. A median split was used, with participants scoring above the median classified as 'high intake' and those at or below the median as 'low intake'. Participants included healthy individuals consuming either a mixed or plant-based diet who were willing to provide dietary information, while those with chronic diseases, pregnancy, or special dietary restrictions were excluded. Informed written consent was obtained from all participants. Dietary intake was assessed using a validated food frequency questionnaire with a 0–7 consumption scale [14]. The questionnaire was adapted for the local population by including region-specific foods and portion sizes. Its reliability was confirmed in a pilot study ( $n=30$ ) with a two-week test-retest, showing good reproducibility (Cronbach's  $\alpha = 0.78$ ). Anthropometric measurements included BMI, waist circumference, hip circumference, and waist-to-hip ratio, measured using standard procedures [15]. Data were analyzed in SPSS version 26.0 using an independent t-test and descriptive statistics. For the

independent t-tests used for inter-group comparisons, the assumption of homogeneity of variances was verified using Levene's Test. As the data met the assumptions of normality and homogeneity of variances, parametric tests were appropriately applied.

## RESULTS

A total of 200 participants were recruited, with a mean age of  $34.2 \pm 8.5$  years. The sample had a balanced gender distribution (51% male, 49% female). Dietary assessment showed that 40% of participants consumed three or more daily servings of whole grains, 55% consumed legumes at least three times per week, 70% consumed at least two daily servings of vegetables, and 65% reported three or more fruit servings daily (Table 1).

**Table 1:** Participant Characteristics and Dietary Intake by Gender

Variables	Total (n=200)	Male (n=102)	Female (n=98)
Age (Years)	$34.2 \pm 8.5$	$35.1 \pm 8.2$	$33.3 \pm 8.7$
Fruit Intake $\geq 3$ Servings/Day	130 (65%)	60 (59%)	70 (71%)
Vegetable Intake $\geq 2$ Servings/Day	140 (70%)	68 (67%)	72 (73%)
Legume Intake $\geq 3$ Times/Week	110 (55%)	56 (55%)	54 (55%)
Whole Grain Intake $\geq 3$ Servings/Day	80 (40%)	38 (37%)	42 (43%)

Participants with higher plant-based diet intake exhibited significantly better anthropometric outcomes. Specifically, their mean BMI and waist-to-hip ratio were lower compared to those with lower plant-based intake (Table 2).

**Table 2:** Anthropometric Outcomes by Plant-Based Diet Score and Gender

Plant-Based Diet Score	Gender	BMI (kg/m <sup>2</sup> )	Waist Circumference (cm)	Waist-to-Hip Ratio
High Intake	Male	$23.5 \pm 2.4$	$80.2 \pm 7.0$	$0.86 \pm 0.05$
	Female	$22.7 \pm 2.6$	$76.9 \pm 7.3$	$0.84 \pm 0.04$
Low Intake	Male	$26.8 \pm 3.3$	$90.1 \pm 8.4$	$0.93 \pm 0.06$
	Female	$26.0 \pm 3.1$	$86.4 \pm 7.9$	$0.91 \pm 0.05$
p-Value	—	<0.01	<0.01	—

Although both groups had anthropometric measurements within WHO-recommended ranges, participants with higher plant-based diet scores exhibited significantly lower BMI, waist circumference, and waist-to-hip ratio compared to those with lower scores ( $p < 0.05$ ), indicating a trend toward improved body composition among plant-based diet consumers.

## DISCUSSION

Plant-based diets are linked to better fat distribution, a lower risk of obesity, and an improved nutritional status [16, 17]. According to the current study, eating more plant-based meals is associated with having a healthier body composition. Although the anthropometric indicators of all participants were within the WHO-recommended normal

ranges, individuals with higher plant-based diet scores exhibited significantly lower BMI, waist circumference, and waist-to-hip ratio compared to those with lower scores. These findings indicate an association between plant-based dietary intake and more favorable fat distribution, rather than a direct causal relationship. Our results align with the findings of Rahbar et al. who reported that individuals adhering to plant-based diets exhibited lower BMI and waist-to-hip ratios compared with those consuming predominantly animal-based foods [18]. Similarly, Ferguson et al. observed that female participants following plant-based dietary patterns demonstrated significantly reduced BMI and waist circumference compared to their counterparts [19]. These studies support the idea that high plant food intake contributes to reduced overall adiposity and less fat accumulation around the abdomen, which is especially important given the role of central obesity as a risk factor for cardiometabolic diseases. A strong association between treatment allocation and positive outcome, regardless of the technique used. This is evidenced by the consistent, strong within-group improvements (all  $p < 0.01$ ) and the absence of a statistically significant or clinically meaningful association between the specific technique (holding vs. pistoning) and the degree of improvement (all between-group  $p > 0.05$ , with small effect sizes). Mechanistically, plant-based diets are typically high in dietary fiber, lower in energy density, and often lead to greater satiety and lower overall caloric intake, which could help explain the anthropometric differences observed. The correlation with waist measures indicates effects not just on overall weight, but primarily on central fat deposition. Given our cross-sectional design, causality cannot be assumed; however, when taken together with longitudinal cohort studies (e.g., fruit intake being inversely associated with weight gain and waist circumference over time), the evidence suggests that promoting higher intake of fruits, vegetables, legumes, and whole grains might be a fruitful strategy to prevent obesity and central adiposity in our population [20]. While associations between plant-based diets and positive health metrics highlight their potential benefits, cross-sectional studies cannot prove cause and effect. The results suggest that promoting greater intake of plant-based foods could be an affordable and practical approach to improve body composition and reduce chronic disease risk. These findings can inform dietary guidelines, community health programs, and policy initiatives encouraging plant-based nutrition.

## CONCLUSIONS

Dietary factors derived from plant-based foods significantly influence nutritional status and health outcomes. Promoting regular inclusion of fruits,

vegetables, legumes, and whole grains in the daily diet offers an affordable way to strengthen community health and lower the likelihood of chronic disorders. Future longitudinal studies are recommended to establish causality and explore specific plant-based components.

## Authors Contribution

Conceptualization: TB, RN

Methodology: TB, AM, RN

Formal analysis: AM, RN

Writing review and editing: TB, AM, RN

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

All the authors declare no conflict of interest.

## Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

## REFERENCES

- [1] Peña-Jorquera H, Cid-Jofré V, Landaeta-Díaz L, Petermann-Rocha F, Martorell M, Zbinden-Foncea H et al. Plant-Based Nutrition: Exploring Health Benefits for Atherosclerosis, Chronic Diseases, and Metabolic Syndrome—A Comprehensive Review. *Nutrients*. 2023 Jul; 15(14): 3244. doi: 10.3390/nu15143244.
- [2] Khalid W, Arshad MS, Ranjha MM, Rózańska MB, Irfan S, Shafique B et al. Functional Constituents of Plant-Based Foods Boost Immunity Against Acute and Chronic Disorders. *Open Life Sciences*. 2022 Sep; 17(1): 1075–93. doi: 10.1515/biol-2022-0104.
- [3] Coelho MS, Fernandes SS, de las Mercedes Salas-Mellado M. Association Between Diet, Health, and the Presence of Bioactive Compounds in Foods. In *Bioactive Compounds*. 2019 Jan; 159–183. doi: 10.1016/B978-0-12-814774-0.00009-8.
- [4] Kussmann M, Abe Cunha DH, Berciano S. Bioactive Compounds for Human and Planetary Health. *Frontiers in Nutrition*. 2023 Jul; 10: 1193848. doi: 10.3389/fnut.2023.1193848.
- [5] Neuhouser ML. The Importance of Healthy Dietary Patterns in Chronic Disease Prevention. *Nutrition research*. 2019 Oct; 70: 3–6. doi: 10.1016/j.nutres.2018.06.002.
- [6] Samtiya M, Aluko RE, Dhewa T, Moreno-Rojas JM. Potential Health Benefits of Plant Food-Derived Bioactive Components: An Overview. *Foods*. 2021 Apr; 10(4): 839. doi: 10.3390/foods10040839.
- [7] Carey CN, Paquette M, Sahye-Pudaruth S, Dadvar A, Dinh D, Khodabandehlou K et al. The Environmental

- Sustainability of Plant-Based Dietary Patterns: A Scoping Review. *The Journal of Nutrition*. 2023 Mar; 153(3): 857-69. doi: 10.1016/j.tjnut.2023.02.001.
- [8] Hargreaves SM, Rosenfeld DL, Moreira AV, Zandonadi RP. Plant-Based and Vegetarian Diets: An Overview and Definition of These Dietary Patterns. *European Journal of Nutrition*. 2023 Apr; 62(3): 1109-21. doi: 10.1007/s00394-023-03086-z.
- [9] Borazjani M, Nouri M, Venkatakrishnane K, Najafi M, Faghih S. Association of Plant-Based Diets with Lipid Profile and Anthropometric Indices: A Cross-Sectional Study. *Nutrition & Food Science*. 2022 Jun; 52(5): 830-42. doi: 10.1108/NFS-06-2021-0181.
- [10] Thomas MS, Huang L, Garcia C, Sakaki JR, Blesso CN, Chun OK et al. The Effects of Eggs in A Plant-Based Diet on Oxidative Stress and Inflammation in Metabolic Syndrome. *Nutrients*. 2022 Jun; 14(12): 2548. doi: 10.3390/nu14122548.
- [11] Fink B, Hunter JM, Pietrzkowski Z, Fink R, Brunssen C, Morawietz H et al. A Plant-Based Dietary Supplement Exhibits Significant Effects on Markers of Oxidative Stress, Inflammation, and Immune Response in Subjects Recovering from Respiratory Viral Infection: A Randomized, Double-Blind Clinical Study Using Vitamin C as a Positive Control. *International Journal of Molecular Sciences*. 2025 May; 26(11): 5209. doi: 10.3390/ijms26115209.
- [12] Gibbs J and Cappuccio FP. Plant-Based Dietary Patterns for Human and Planetary Health. *Nutrients*. 2022 Apr; 14(8): 1614. doi: 10.3390/nu14081614.
- [13] Tso R and Forde CG. Unintended Consequences: Nutritional Impact and Potential Pitfalls of Switching from Animal-to Plant-Based Foods. *Nutrients*. 2021 Jul 23; 13(8): 2527. doi: 10.3390/nu13082527.
- [14] Steinemann N, Grize L, Ziesemer K, Kauf P, Probst-Hensch N, Brombach C. Relative Validation of a Food Frequency Questionnaire to Estimate Food Intake in an Adult Population. *Food and Nutrition Research*. 2017. doi: 10.1080/16546628.2017.1305193.
- [15] Baïoumi AY. Comparing Measures of Obesity: Waist Circumference, Waist-Hip, and Waist-Height Ratios. *Innutrition in the Prevention and Treatment of Abdominal Obesity*. 2019 Jan; 29-40. doi: 10.1016/B978-0-12-816093-0.00003-3.
- [16] Jarvis SE, Nguyen M, Malik VS. Association Between Adherence to Plant-Based Dietary Patterns and Obesity Risk: A Systematic Review of Prospective Cohort Studies. *Applied Physiology, Nutrition, and Metabolism*. 2022 Aug; 47(12): 1115-33. doi: 10.1139/apnm-2022-0059.
- [17] Mambrini SP, Penzavecchia C, Menichetti F, Foppiani A, Leone A, Pellizzari M et al. Plant-Based and Sustainable Diet: A Systematic Review of Its Impact on Obesity. *Obesity Reviews*. 2025 Jun; 26(6): e13901. doi: 10.1111/obr.13901.
- [18] Rahbar AR, Kalantarhormozi M, Izadi F, Arkia E, Rashidi M, Pourbehi F et al. Relationship Between Body Mass Index, Waist-to-Hip Ratio, and Serum Lipid Concentrations and Thyroid-Stimulating Hormone in the Euthyroid Adult Population. *Iranian Journal of Medical Sciences*. 2017 May; 42(3): 301.
- [19] Ferguson JJ, Oldmeadow C, Mishra GD, Garg ML. Plant-Based Dietary Patterns Are Associated with Lower Body Weight, BMI and Waist Circumference in Older Australian Women. *Public Health Nutrition*. 2022 Jan; 25(1): 18-31. doi: 10.1017/S1368980021003852.
- [20] Schwingshackl L, Hoffmann G, Kalle-Uhlmann T, Arregui M, Buijsse B, Boeing H. Fruit and Vegetable Consumption and Changes in Anthropometric Variables in Adult Populations: A Systematic Review and Meta-Analysis of Prospective Cohort Studies. *PLoS ONE*. 2015 Oct; 10(10): e0140846. doi: 10.1371/journal.pone.0140846.