International Journal of Academic Research and Development
www.multidisciplinaryjournal.in
ISSN: 2455-4197
Received: 22-11-2023, Accepted: 08-12-2023, Published: 28-12-2023
Volume 8, Issue 6, 2023, Page No. 34-35

Impact of cooking methods on the glycemic index of mung beans

Kidane Lewoye, Shimeles Mengisteab
Department of Environmental Health Science and Technology, Jimma University, Ethiopia

Abstract
This study investigates the effect of various cooking methods on the glycemic index (GI) of mung beans (*Vigna radiata*), a nutrient-dense legume known for its low natural GI. Cooking methods assessed include boiling, steaming, and microwaving. The research aims to provide insights into how these methods influence the GI of mung beans, contributing to dietary recommendations for glycemic control and the management of diabetes.

Keywords: Mung beans (*Vigna radiata*), glycemic index (GI), cooking methods

Introduction

Mung beans (*Vigna radiata*) have been cultivated and consumed across the globe for centuries, primarily in Asia, due to their rich nutritional profile and versatile culinary applications. Recognized as a valuable source of plant-based protein, dietary fiber, vitamins, and minerals, mung beans play a pivotal role in various dietary patterns aimed at promoting health and preventing diseases. Beyond their basic nutritional benefits, mung beans have been noted for their low glycemic index (GI), making them a preferred food choice for individuals managing blood glucose levels, such as those with diabetes or prediabetes. The glycemic index is a critical measure that ranks foods on a scale from 0 to 100 based on their impact on blood glucose levels. Foods with a low GI are digested and absorbed more slowly, leading to a gradual rise in blood glucose and insulin levels, which is beneficial for glycemic control. The inherent low GI of mung beans suggests their potential utility in dietary strategies designed to stabilize blood glucose levels, mitigate the risk of type 2 diabetes, and support weight management. However, the impact of various cooking methods on the GI of foods has been a subject of ongoing research, as cooking can significantly alter the nutritional composition and physical properties of foods, thereby influencing their glycemic response. Common cooking methods, such as boiling, steaming, and microwaving, vary in terms of temperature, cooking time, and water usage, each potentially affecting the starch gelatinization process and the ultimate glycemic index of the food. Understanding how these cooking methods specifically impact the glycemic index of mung beans is crucial for maximizing their health benefits and for providing evidence-based dietary recommendations. Despite the recognized importance of mung beans in a healthful diet and their potential for glycemic management, there is a paucity of research focused on how different cooking methods affect their glycemic properties. This gap in the literature underscores the need for systematic investigation into the relationship between cooking techniques and the glycemic index of mung beans.

Main Objective

The primary objective of this study is to evaluate the impact of various cooking methods on the glycemic index of mung beans.

Materials and Methods

Sample Preparation: Mature, dry mung beans were selected, washed, and soaked overnight.

Three cooking methods were applied

Boiling: Mung beans were boiled in water for 20 minutes.

Steaming: Beans were steamed over boiling water for 20 minutes.

Microwaving: Beans were microwaved at 800W for 5 minutes with a minimal amount of water.

Glycemic Index Determination: The GI was determined using a standardized method. Healthy volunteers consumed 50g of carbohydrate from cooked mung beans after an overnight fast. Blood glucose levels were measured at baseline and at intervals up to 2 hours post-consumption. The GI was calculated by comparing the area under the blood glucose response curve (AUC) for mung beans to that of a reference food (glucose).

Statistical Analysis: Differences in the GI among cooking methods were analyzed using one-way ANOVA with post-hoc Tukey tests. Significance was set at $p<0.05$.

Results

The GI values for mung beans cooked by boiling, steaming, and microwaving were significantly different. Boiled mung beans exhibited the highest GI, followed by steamed, and microwaved beans had the lowest GI.

Table 1: Glycemic Index of Mung Beans Based on Cooking Method

Cooking Method	Glycemic Index (GI)	Standard Deviation (SD)	Participants (n)
Boiling	55	±4.5	20
Steaming	50	±3.8	20
Microwaving	45	±3.2	20
Control (Raw)	40	±2.5	20

Analysis of Results

The results table indicates that the cooking method significantly impacts the glycemic index of mung beans;

Boiling resulted in the highest GI (55), suggesting that this method facilitates greater starch gelatinization and breakdown, leading to faster glucose absorption. Steaming showed a moderate GI value (50), offering a balance between cooking efficiency and nutrient preservation, including the starch structure. Microwaving, with the lowest GI (45), suggests minimal disruption to the beans' starch structure, likely due to the shorter cooking time and reduced water usage, preserving the beans' low GI characteristics. The Control (Raw) group had the lowest GI (40), underscoring the inherently low glycemic response elicited by raw mung beans. The study findings indicate that cooking methods significantly affect the GI of mung beans. Boiling, which involves longer cooking times and greater water contact, may lead to a higher breakdown of starches into simpler sugars, thus increasing the GI. Steaming represents a moderate impact, while microwaving, with the shortest cooking time, preserves the beans' low GI best. These results underscore the importance of cooking methods in dietary planning for glycemic control.

Conclusion

The study "Impact of Cooking Methods on the Glycemic Index of Mung Beans" provides a comprehensive analysis of how different cooking methods influence the glycemic index (GI) of mung beans, a legume known for its nutritional benefits and low glycemic characteristics. Through the comparison of boiling, steaming, and microwaving, this research has illuminated significant variations in GI values resulting from the cooking process, offering insights critical for dietary management and health promotion. The findings reveal that the cooking method plays a crucial role in determining the GI of mung beans. Specifically, microwaving emerged as the most beneficial cooking technique to preserve the low GI of mung beans, with a GI value of 45. This method's ability to maintain a lower GI can be attributed to its shorter cooking time and reduced water interaction, which minimally alters the beans' starch structure. Steaming, with a GI value of 50, also demonstrates a favorable impact on preserving the beans' low glycemic properties, though to a lesser extent than microwaving. Boiling, however, resulted in the highest GI value of 55, likely due to the extensive starch gelatinization and the greater breakdown of polysaccharides into simpler sugars, which increases the rate of glucose absorption. These findings have significant implications for nutritional science, especially in the context of managing diabetes and promoting healthy eating habits. The ability to modulate the GI of mung beans through cooking methods can aid in the development of dietary strategies that leverage the health benefits of this legume, including its role in blood sugar regulation, weight management, and chronic disease prevention. Moreover, the study underscores the importance of cooking practices in the nutritional profiling of foods, suggesting that the selection of cooking methods should be a deliberate component of diet planning, particularly for foods consumed with the intention of managing glycemic response. Future research should expand on these findings, exploring the mechanistic reasons behind the differential impact of cooking methods on GI and examining the effects on other legumes and food types. Additionally, longitudinal studies assessing the long-term health outcomes associated with the consumption of mung beans cooked by different methods would further elucidate their role in a balanced, health-promoting diet. In conclusion, this study highlights the impactful role of cooking methods on the glycemic index of mung beans, offering valuable guidance for individuals seeking to optimize their dietary intake for health benefits. By choosing appropriate cooking techniques, such as microwaving, it is possible to enjoy mung beans as part of a diet that supports glycemic control and overall well-being.

References

1. Hou D, Zhao Q, Yousaf L, Xue Y, Shen Q. *In vitro* starch digestibility and estimated glycemic index of mung bean (*Vigna radiata* L.) as affected by endogenous proteins and lipids, and exogenous heat-processing methods. Plant Foods for Human Nutrition,2020 Dec:75:547-52.
2. Kebede ZY. Case study report on improved mung bean technology demonstration under North-West Ethiopia. Int. J Agric. Food Sci,2022:4(1):35-37. DOI: 10.33545/2664844X.2022.v4.i1a.63
3. Singh M, Manickavasagan A, Shobana S, Mohan V. Glycemic index of pulses and pulse-based products: A review. Critical Reviews in Food Science and Nutrition,2021 May 15:61(9):1567-88.
4. Lin MH, Wu MC, Lu S, Lin J. Glycemic index, glycemic load and insulinemic index of Chinese starchy foods. World Journal of Gastroenterology: WJG. 2010,Oct 10:16(39):4973.
5. Kaur M, Sandhu KS, Ahlawat R, Sharma S. *In vitro* starch digestibility, pasting and textural properties of mung bean: effect of different processing methods. Journal of food science and technology,2015 Mar:52:1642-8.
6. Siddhuraju P, Becker K. Nutritional and antinutritional composition, *In vitro* amino acid availability, starch digestibility and predicted glycemic index of differentially processed mucuna beans (Mucuna pruriens var. utilis): an under-utilised legume. Food chemistry,2005 Jun 1:91(2):275-86.
7. Lal MK, Singh B, Sharma S, Singh MP, Kumar A. Glycemic index of starchy crops and factors affecting its digestibility: A review. Trends in Food Science & Technology,2021 May 1:111:741-55.
8. Kumar A, Panda PA, Lal MK, Ngangkham U, Sahu C, Soren KR, *et al*. Addition of pulses, cooking oils, and vegetables enhances resistant starch and lowers the glycemic index of rice (*Oryza sativa* L.). Starch-Stärke,2020 Sep:72(9-10):1900081.
9. Chillo S, Monro JA, Mishra S, Henry CJ. Effect of incorporating legume flour into semolina spaghetti on its cooking quality and glycaemic impact measured *In vitro*. International journal of food sciences and nutrition,2010 Mar 1:61(2):149-60.