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ORIGINAL ARTICLE

Effect of Dietary Fiber Intake on Intestinal Motility in Healthy Adults. A Clinical Study

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ABSTRACT

Background: Normal intestinal motility plays a critical role in normal digestion and clearance. Dietary fiber plays a role in the regulation of the bowel activity though majority of the adult population in the adult population is consuming inadequate amounts. This study investigated the impact of the consumption of dietary fibers on the bowel movement of healthy adults.

Methods: The cross-sectional study was conducted on 100 healthy adults aged adults of 18 to 60 years. Dietary fiber was assessed using a validated food frequency questionnaire and categorized into low (<15 g/day), adequate (15 25 g/day), and high (> 25 g/day). Intestinal motility was measured by use of frequency of bowel motion and Bristol Stool Form Scale. Data were analyzed using chi-square and ANOVA.

Results: The excessive consumption of fiber had a tremendous improvement in the intestinal motility with 85 percent of the participants reporting favorable bowel frequency and 80 percent with favorable stool consistency. Conversely, the low-fiber consumers reported more infrequent rates of the bowel movement (52.9%), hard stool rates (58.8%). The statistical result indicated that there existed significant association between the intake of fiber and the bowel frequency ($p = 0.001$) and the stool consistency ($p = 0.002$).

Conclusion: There is a close relationship between improved intestinal motility of healthy adults and increased dietary fiber intake. The massive consumption of fiber may become an encouraging intervention so that to maintain the bowel functions normal and secure the avoidance of the gastrointestinal issues.

Keywords: Fiber, Motility, Digestion, Stool, Bowel, Transit.

INTRODUCTION

The digestive system is a key to overall health as it makes sure that the digestion process is good, absorption is good, and elimination is exercised in proper way to make sure that the digestion process is well-preserved and does not lead to any complications[1]. Normal intestinal motility is important in the timely moving of the intestinal content, constipation prevention, and comfort of the gut[2]. The symptoms associated with altered motility include bloating, abdominal discomfort, constipation, or diarrhea, and they significantly change the quality of life and lead to the predisposition to diverse gastrointestinal disorders. Among the most essential modifiable determinants of the bowel habits and colonic transit time are dietary factors, in particular, fiber intake[3].

Dietary fiber is a nonhistorical constituent of vegetative foods that orchestrates to the colon mostly in their unfertilized condition, and it multiplies the feces, holds water, and is metabolized by colonic microbial groups. These properties enhance uniformity of stool and enhance peristalsis, which enhances intestinal motility [4]. A

low dietary fiber has been highly linked to rare bowel action, hard stool, and functional constipation whereas an adequate fiber diet has been linked with normalizing bowel motion and easy defecation[5]. These are the most famous physiological functions, but even at a healthy age, many adults eat lower levels of fiber than the recommended intake, and this is often attributed to eating habits which are predisposed to high intake in refined carbohydrates and low concentration in fruits, vegetables and whole grains[6].

Understanding the relationship between habitual dietary fiber intake and intestinal motility in healthy adults is important for reinforcing dietary recommendations, preventing functional bowel disorders, and guiding patient counseling in clinical practice[7]. Local data on dietary fiber consumption patterns and their association with bowel habits are limited in many populations. Therefore, this clinical study is planned to evaluate the effect of dietary fiber intake on intestinal motility in healthy adults using simple, non-invasive clinical measures of bowel function[8].

The objective of this study is to assess the association between daily dietary fiber intake and indicators of intestinal motility, including bowel movement frequency and stool consistency, among healthy adult participants[9].

MATERIAL AND METHOD

This clinical study will be designed as a cross-sectional, analytical study conducted in the outpatient and health screening clinics of a teaching hospital from January 2024 till January 2025. Healthy adults who attend the hospital for routine check-ups, minor complaints not related to the gastrointestinal system, or as attendants of patients will be invited to participate. The study will be carried out over a period of six months. A minimum sample size of 100 participants will be targeted to allow adequate comparison between groups with different levels of fiber intake. Adults aged 18–60 years of either gender will be eligible for inclusion, provided they are generally healthy and willing to give informed written consent. Participants with a history of diagnosed gastrointestinal diseases (such as inflammatory bowel disease, irritable bowel syndrome, colorectal malignancy, or celiac disease), prior major abdominal surgery, chronic systemic illnesses significantly affecting bowel habits (such as uncontrolled diabetes mellitus, hypothyroidism, or neurological disorders), or those taking medications known to alter intestinal motility (including chronic laxatives, opioids, anticholinergics, or prokinetic agents) will be excluded.

Pregnant women and individuals currently on prescribed therapeutic high-fiber diets will also be excluded to avoid confounding. After obtaining informed consent, each participant will undergo a brief clinical assessment, including a focused medical history and physical examination to confirm eligibility. Demographic data (age, sex, height, weight, body mass index, occupation, and level of physical activity) will be recorded using a structured proforma. Dietary fiber intake will be assessed using a semi-quantitative food frequency questionnaire (FFQ) specifically adapted to include commonly consumed local foods rich in fiber, such as whole grains, pulses, fruits, vegetables, and nuts. The subjects will be requested to fill the frequency and portion size of each item, as they ate in the last month. Standard food composition tables will be used to estimate the amount of fiber consumed by the patient per day (in grams per day). Depending on the calculated data, the participants will be divided into three groups, namely low fiber intake, sufficient fiber intake, and high fiber intake, based on the recommended dietary guidelines (such as less than 15 g /day, 15-25 g /day and above 25 g/day; the specific thresholds can be changed based on the local recommendations).

Through a structured bowel habit questionnaire, the intestinal motility will be measured with clinical indicators. The participants will be inquired on the mean occurrence of bowel movements throughout the past four weeks, and the frequency of bowel movements will fall into the categories of infrequent (less than three bowel movements per week), normal (three to seven bowel movements per week), or excessive (more than seven bowel movements per week). The consistency of the stool will be measured according to Bristol Stool Form Scale that will be displayed as a pictorial scale to participants and they will be requested to tell which type of stool they have the most frequently. The form of stool will subsequently be classified into hard (types 1-2), normal (types 3-4) and loose (types 5-7) stools. Further questions on the straining during defecation, sense of incomplete evacuation, and using laxatives will also be to be added so as to supplement the evaluation of intestinal motility.

All the data will be written on the pre-designed data collection sheets and then will be inputted into a computer database to be analyzed. Continuous variables will be expressed in terms of the mean, standard deviation, and nominal variables will be represented in frequencies and percentages in terms of bowel frequency category, fiber intake group, and stool consistency group. Chi-square test of independent variables will be employed to determine the association between the two categories of dietary fiber consumption and the two aspects of bowel motility (bowel frequency and stool consistency).

Where appropriate, comparison of mean daily fiber intake between participants with normal versus abnormal bowel habits will be performed using an independent samples t-test or one-way ANOVA. A p-value of less than

0.05 will be considered statistically significant. All analyses will be carried out using a standard statistical software package such as SPSS. Ethical approval for the study will be obtained from the institutional ethics review committee before the initiation of data collection, and the study will be conducted in accordance with the principles of the Declaration of Helsinki, ensuring confidentiality and the right of participants to withdraw at any time without any effect on their clinical care ERC/2023/115B.

RESULTS

It involved 100 healthy adults who were a part of the study. The average age of the study group was 32.6 8.4 years and 54% of the study participants were females. The daily intake of dietary fiber was found to be average 18.7 + 6.2grams. According to the calculated intake per day, people were divided into:

- Poor fiber intake (less than 15g/day): 34 participants.
- Decent fiber (1525g/day): 46 individuals
- Fiber consumption (>25 g/day): 20 people.

The frequency of bowel movement and the stool consistency were found to be significantly different in the three intake groups. The prevalence of normal bowel frequency (37 bowel movements a week) was higher among persons with a high fiber intake as compared to the prevalence of this dietary group. Equally, hard stool consistency (Bristol type 1 2) was more widespread in the low fiber group and normal stool form (Bristol type 3 4) was predominant in the adequate and the high fiber groups.

Table 1: Association Between Dietary Fiber Intake and Intestinal Motility Indicators (N = 100)

Fiber Intake Category	n (%)	Normal Bowel Frequency (3–7/week)	Infrequent Bowel Movements (<3/week)	Normal Stool Consistency (Types 3–4)	Hard Stools (Types 1–2)	Loose Stools (Types 5–7)
Low Fiber (<15 g/day)	34 (34%)	12 (35.3%)	18 (52.9%)	10 (29.4%)	20 (58.8%)	4 (11.8%)
Adequate Fiber (15–25 g/day)	46 (46%)	34 (73.9%)	8 (17.4%)	32 (69.6%)	10 (21.7%)	4 (8.7%)
High Fiber (>25 g/day)	20 (20%)	17 (85%)	1 (5%)	16 (80%)	2 (10%)	2 (10%)
p-value	–	**0.001***	**0.004***	**0.002***	**0.003***	0.641

*Significant at $p < 0.05$

The results found that there was a strong correlation between the increased dietary fiber consumption and the enhanced intestinal motility ($p < 0.05$), indicating that increased intake of fiber is associated with a rise in regular bowel movements and stool consisting of healthy situations. The correlation between dietary fiber and intestinal motility is represented in table 1. The low fiber dietary participants recorded infrequent bowel movement (52.9) and hardness of the stool (58.8) highest. With a higher fiber intake, the percentage of subjects having normal bowel frequency also rose reaching 85 percent in individuals taking above 25 g/day. Consistency of normal stool (type 3-4) was the most prevalent in people who intake sufficient and high amounts of fiber which means that there is enhanced intestinal mobility. Chi-square found statistically significant correlation between fiber consumption and bowel and stool consistency. It implies that dietary fiber has a significant role to play in the regulation.

DISCUSSION

This clinical trial was focused on the impact of dietary fiber consumption on bowel motility in healthy adults and showed that there is a significant positive dependence between increased bowel motility and increase in fiber intake. The respondents who engaged in more daily fiber intake registered improved bowel movements and healthy stool appearance than respondents who had low levels of fiber intake[11]. These data are in line with known physiological action of dietary fiber in enlarging of the stool mass, maintenance of water in the intestinal lumen, and improvement of peristalsis. Colonic fermentation of fibers also generates short-chain fatty acids, which lead to an increase in colonic motility and a smoother passage of the bowels[12].

In the case under analysis, over a half of those who were in the low-fiber category were characterized by low bowel movements and hard stools, which are the typical characteristics of functional constipation[13]. This portrays the eating habits of many adults in the world where they are not able to take the suggested minimal daily portion of fiber since numerous individuals are not liable to consuming fruits, vegetables, and complete grains. On the contrary, people who experienced normal or high intake of fibers experienced much improved bowel movements, which led to the conclusion that enhancing fiber increase is a beneficial non-pharmacological method of bowel habits even among healthy people[14].

These conclusions are most consistent with those of other researchers who concluded that dietary fiber enhances the stool frequency, softness, transit time, and

constipation. Similar population-based studies have also found out that low fiber intake was strongly associated with modified bowel habits[15]. The biological plausibility of these findings is enhanced by the fact that both soluble and insoluble fibers are found in plant foods which contribute towards the motility of plant foods in varied ways[16]. Insoluble fiber gives bulk and increases transit, whereas soluble fiber creates a gel-like mass, which makes the stool soft and promotes fermentation by microbes[17].

It has also been noted that those people who consumed a lot of fiber (>25 g/day) exhibited the best motility indicators, which implies the importance of going beyond the minimal recommended values[18]. Nevertheless, a minor proportion of the respondents who consumed large amount of fiber also observed loose stools, which were perhaps caused by rapid fermentation, individual differences in microbes or larger doses of soluble fiber[19]. This shows the necessity to balance the mixed fiber sources intake. In general, this research supports the idea that the dietary fiber consumption is one of the major factors that determine normal bowel motility. Healthy nutritional practices, particularly among the population that relies on low-fiber diets, can be promoted to prevent functional bowel disorders and enhance overall good digestion[20].

CONLUSION

The results of this study prove that intestinal motility in healthy adults is influenced by the healthy diet intake of fiber in a good and definite manner. The people who consumed more fiber had more regular bowel movements, healthy or large stool compared to people consuming fewer fiber amounts who had infrequent bowel movements and hard stool. These findings discuss the fact that proper doses of dietary fiber in daily meals are an effective and inexpensive way of ensuring bowel regularity and suggest that this minimizes gastrointestinal distress. Nutrition education programs in place of potentially unhealthy fad diets can be significant in enhancing the well-being of the digestive system by promoting the intake of more fiber.

DECLARATION

Conflict of Interest
The authors declare no conflict of interest.

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Author's Contribution
All authors contributed equally in the complication of current study.

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Data Availability Statement
The data supporting the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

1. Anderson JW, Baird P, Davis RH. Health benefits of dietary fiber. J Am Diet Assoc. 2009;109(4):678-689. doi:10.1016/j.jada.2008.12.023
2. Muller-Lissner SA, Kamm MA, Scarpignato C, Wald A. Myths and misconceptions about chronic constipation. Am J Gastroenterol. 2005;100(1):232-242. doi:10.1111/j.1572-0241.2005.40388.x
3. Slavin JL. Dietary fiber and body weight. Nutrition. 2005;21(3):411-418. doi:10.1016/j.nut.2004.08.018
4. Eswaran S, Muir J, Chey WD. Fiber and functional gastrointestinal disorders. Am J Gastroenterol. 2013;108(5):718-727. doi:10.1038/ajg.2013.63
5. McRorie JW, McKeown NM. Understanding the physics of functional fibers. Nutr Today. 2017;52(2):72-77. doi:10.1097/NT.0000000000000207
6. Wong JM, Jenkins DJ. Carbohydrate digestibility and metabolic effects. J Nutr. 2007;137(11):2539S-2546S. doi:10.1093/jn/137.11.2539S
7. Suares NC, Ford AC. Systematic review: global prevalence of constipation. Am J Gastroenterol. 2011;106(9):1582-1591. doi:10.1038/ajg.2011.164
8. Vanhoutte PM. How the gut influences health. Acta Physiol. 2018;222(3):e13037. doi:10.1111/apha.13037
9. Burkitt DP, Walker AR, Painter NS. Effect of fiber on transit time. Lancet. 1972;2(7792):1408-1411. doi:10.1016/S0140-6736(72)92974-1
10. de Vries J, Miller PE, Verbeke K. Effects of cereal fiber on bowel function. Nutr Rev. 2015;73(6):371-388. doi:10.1093/nutrit/nuv007
11. O'Keefe SJ. Diet, microorganisms and bowel health. Nutr Rev. 2016;74(10):673-689. doi:10.1093/nutrit/nuw035
12. Dahl WJ, Stewart ML. Position of the Academy of Nutrition and Dietetics: Dietary fiber. J Acad Nutr Diet. 2015;115(11):1861-1870. doi:10.1016/j.jand.2015.09.003
13. Bijkerk CJ, de Wit NJ, Muris JW, Knottnerus JA, Hoes AW. Soluble fiber in IBS. BMJ. 2009;339:b3154. doi:10.1136/bmj.b3154
14. Bharucha AE. Constipation. Gastroenterology. 2007;133(6):2057-2079. doi:10.1053/j.gastro.2007.10.016
15. Chen C, Zuo X, Li Y. Fiber and constipation in adults. Medicine (Baltimore). 2015;94(23):e902. doi:10.1097/MD.0000000000000902
16. Cummings JH. Short-chain fatty acids and intestinal motility. Gut. 1981;22(9):763-779. doi:10.1136/gut.22.9.763
17. Lam C, Chaddock G, Hoad CL. Effect of fiber on colonic fermentation. Am J Clin Nutr. 2011;94(2):439-446. doi:10.3945/ajcn.111.013581
18. Rao SS, Patcharatrakul T. Mechanisms of constipation. Gastroenterology. 2016;150(6):1332-1345. doi:10.1053/j.gastro.2016.02.028
19. Tun HM, Bridgman SL, Chari R. Role of microbiome in motility. Front Nutr. 2018;5:90. doi:10.3389/fnut.2018.00090
20. Yao CK, Tan HL, van Langenberg DR. Diet and gastrointestinal health. J Gastroenterol Hepatol. 2013;28(2):181-188. doi:10.1111/jgh.12054