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Research Article

Impact of a Diet-Based Educational Intervention on Awareness of Hypertension and Diabetes Mellitus Among Adults in Delhi: A Community-Based Pre-Post Study

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ABSTRACT

Hypertension and diabetes mellitus are one of the major Non Communicable Diseases that are prevalent in all countries and poses a big concern to public health. Both of these conditions have been known to have modifiable risk factors such as poor nutrition, physical inactivity, overweight/obesity and lifestyle factors. The appropriate dietary control is an important aspect of preventing future complications in hypertension and diabetes mellitus. One of the challenges is that many adults have a lack of awareness and understanding about nutrition and its importance in preventing and treating these diseases. Therefore, there is a need for community based nutrition education intervention programs. The present study was aimed at evaluating the awareness of role of diet in hypertension and diabetes mellitus in adults and its effectiveness by nutrition education intervention. A community-based interventional pre and post study was conducted among 30 randomly selected adults of 18 to 50 years of age in Delhi, India. A pre-test baseline assessment was made by a structured questionnaire regarding knowledge about hypertension, diabetes mellitus, importance of dietary and lifestyle modification for prevention and management, symptoms, complications and preventive measures of these conditions. Post nutrition education intervention based on the topic was made through poster presentation with interactive session. Post-test was conducted after education intervention, and the same structured questionnaire was used. Data were subjected to appropriate statistical analysis by frequency, percent, mean, 95% confidence interval, etc. It was seen that 56.7% of participants were between the age of 36 to 50 years.

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More than 66.7% of them were physically inactive and 80.0% did not have a balanced diet. Mean score of awareness regarding hypertension and diabetes mellitus in pre-test was 11.06 ± 5.45 which increased significantly to 16.46 ± 3.74 in the post-test. The score for awareness increased to an average score of 5.40 after the intervention. The effectiveness of nutrition education intervention is to increase awareness about HBP and DM. For awareness programs on diet and nutrition management and healthy lifestyle practices to control and prevent NCDs, community based interventions are helpful.

INTRODUCTION

Non-communicable diseases (NCDs) are a major cause of morbidity and mortality worldwide and are a significant public health challenge in both developed and developing countries. Cardiovascular diseases, diabetes mellitus, chronic respiratory diseases and cancers account for the majority of deaths from NCDs in the world, with an estimated 74% of global mortality attributable to such diseases. These diseases have been increasing in recent years due to urbanization, industrialization, aging, poor nutritional habits, lack of physical activity, smoking, drinking excessive amounts of alcohol. There are some countries like India that are experiencing an extremely fast disease transition, that is, an epidemic of infectious diseases is co-occurring with a growing pattern of chronic noncommunicable diseases. [2] Of the various NCDs, hypertension and diabetes mellitus are of significant importance considering their high prevalence, lifelong nature, and the potential for associated morbidities and mortalities. These conditions have an impact on the incidence of heart and blood vessel disease and mortality, as well as placing substantial social and financial burden in the community. Co-existence of these two chronic diseases enhances the occurrence of cardiovascular disease, stroke, renal illness, and death. Thus, prevention and control of NCDs, particularly hypertension and diabetes mellitus are

the top priorities of public health and clinical practice. As defined in [3, 4] hypertension is a condition where either the systolic or diastolic pressure is raised above a certain limit, or both. It can cause heart failure, cerebral stroke, renal failure and blindness and is a potential life threatening disease that is not detected until a severe complication occurs. Therefore, hypertension is also referred to as a "silent killer." Uncontrolled hypertension accelerates the hardening of arteries and blood vessel damage and affects vital organs like the brain, heart, and kidney. Risk factors for hypertension include age, obesity, high salt consumption, physical inactivity, smoking, alcohol use, stress, and unhealthy eating habits. Hypertension, although a controllable disease with appropriate medication and lifestyle changes, is usually asymptomatic and remains undiagnosed and uncontrolled in several people. [5, 6] Diabetes mellitus (DM) is a complex metabolic disorder with several manifestations which have been reported as a global public health problem, characterized by hyperglycemia, resulting from defects in insulin secretion, insulin action or both, with a risk of associated microvascular and macrovascular complications. It is a common disease which can lead to several chronic disabilities and life threatening complications involving various organ systems like the eyes, heart, kidneys, nervous system and lower extremities. Type 2 diabetes mellitus constitutes 90-95% of all diabetes cases and is linked to the obesity, physical inactivity, dietary habits and family history. India being one of the largest countries suffering from diabetes mellitus (DM) is a health problem where prevalence of DM is on the rise and burden of the disease is likely to rise further and may pose a management challenge. [7, 8]. A significant percentage of the population has an increased risk of getting diabetes and hypertension, especially the older age group, and is at an increased risk of developing



cardiovascular disease. Dietary intervention plays a significant role in prevention and management of chronic health conditions like hypertension and diabetes, and evidence has shown that a healthy diet may reduce the risk of disease development and also improve the clinical outcome of these two diseases. [9] Diet control measures of hypertension include reducing consumption of fat especially saturated fat, trans fat and salt and increasing consumption of fruits and vegetables and adequate potassium consumption. In diabetes, diet control measures include controlling intake of refined carbohydrate, increasing dietary fiber consumption, reduction of refined sugars, portion control and maintaining ideal body weight. These interventions are shown to be effective in maintaining blood pressure, in controlling blood glucose and cardiovascular complications. [10, 11] However, despite these evidence-based measures, there is inadequate awareness regarding importance and role of diet in prevention and management of hypertension and diabetes among people. Lack of adequate knowledge, incorrect ideas about diet, insufficient knowledge of the disease and limited access to health information leads to unhealthy diet and lifestyle. Indeed, numerous individuals with hypertension and diabetes are diagnosed at some point when they begin to experience symptoms or complications [12,13]. Hence, awareness creation on diet management and healthy living is a significant measure towards combating the disease burden and enhancing health. Interventions based upon health education seem to be useful to raise awareness and to encourage positive behavior change [14,15]. Community-based health education programs can be effective in enhancing awareness on symptoms, causes, prevention and dietary guidelines for hypertension and diabetes. Posters, pamphlets, audio-visual aids, group discussion, individual counseling have been employed in diverse studies, pamphlets and

posters for health promotion and education [16]. Posters are a desirable choice for awareness programs, because these are simple, cheap, attractive and can be easily understood by uneducated groups. Education and interventions on nutrition have been successful in promoting awareness and knowledge to the community about prevention and control of chronic diseases particularly lifestyle disorders [17]. Interventions have been shown to be effective in improving the dietary and lifestyle behaviors, treatment adherence and self-management of chronic disease conditions [18]. Community interventions for non-communicable diseases prevention and control are essential to increase awareness and educate the communities. They can be particularly relevant in low resource areas where access to healthcare facilities is a problem. Awareness creation programs empower community members with knowledge and information, which can be useful to make healthier lifestyle choices. In India, the Government has made it a point to create awareness, early diagnosis and treatment for prevention and control of chronic diseases as seen in the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke. More work is required for increasing awareness about prevention and control of chronic diseases particularly in adults who are at a higher risk of developing diabetes and hypertension diseases [19,20]. Combining multi-faceted approaches to communication, using traditional and innovative approaches tailored for the community, is likely to have synergistic effects [21,22]. School-based and workplace wellness nutrition education initiatives can be an effective tool for changing individual eating and activity patterns and developing sustainable habits for disease prevention [23,24]. Plus, closing the "information gap," by embedding nutrition education into everyday primary care, will also be vital, because many people do not have the



knowledge or skills to understand and use nutritional information and make informed food choices [25]. Participatory action-research can help assure cultural relevance and practical applicability of interventions. Thus, the present study was taken up to assess the awareness regarding the importance of diet in hypertension and diabetes mellitus and to find out the effectiveness of intervention on awareness level of nutrition in adults of Delhi. It also assessed the various dietary and lifestyle practices and risk factors for the diseases. Further, it was also tried to see whether a poster-based intervention on nutrition was effective in improving the nutrition awareness and lifestyle-related risk factors in study participants. The findings from the study could be useful in the design of appropriate community-based interventions in terms of enhancing nutrition awareness to prevent hypertension and diabetes mellitus.

The aims of the Study are:

Specific Objective: To evaluate and enhance awareness on the importance of diet in hypertension and Diabetes mellitus.

Specific Objectives:

1. To determine baseline knowledge about hypertension and diabetes mellitus in adult population.
2. To evaluate the level of awareness about the symptoms, risk factors, complications and management of diabetes and hypertension.
3. Evaluate risk factors for diabetes and high blood pressure due to diet and lifestyle.
4. To organize and conduct Awareness programs with posters about nutrition.

5. To assess the efficacy of the educational intervention by means of pre test and post test.
6. To encourage to adopt a healthy lifestyle and healthy diet.

Materials and Methods

Study Design A pre – post community based intervention was implemented to assess nutrition awareness among adults, and to check the effectiveness of a nutrition education intervention about the role of nutrition in hypertension and diabetes mellitus. The study used a structured questionnaire approach to pre- and post-test the participants' knowledge. **Study Area** The research was conducted in the city of Delhi, India. The study area consisted of adults who lived in the local community and were available for the study period.

Study Population

The study population consisted of adults aged between 18 and 50 years residing in Delhi. Individuals from different educational, occupational, and socioeconomic backgrounds were included to obtain a representative assessment of community awareness regarding hypertension and diabetes mellitus.

Study Duration

The study was conducted during January to February 2025. This process was made up of all the activities such as participant recruitment, baseline assessment, educational intervention, post-test evaluation, data analysis and report preparation.

Sample Size



There were 30 participants in total. A random sampling method was used for selecting the participants.

Sampling Technique

The sampling method used for the study was simple random sampling. Participants who met the inclusion criteria and consented to participate were recruited by providing informed consent, orally.

Inclusion Criteria

The following participants were included in the study:

- Adults aged 18-50 years.
- The people who live in the selected study area. People are ready to take part in the study.
- People giving oral consent.

Exclusion Criteria

The following people were not included in the study:

- People under the age of 18 and over 50.
- Individuals are unwilling to participate.
- Participants had difficulties comprehending or answering the questionnaire.

Ethical Considerations

The study was of voluntary participation. All participants were informed of the purpose and methods of the study prior to their inclusion in the study. All participants gave informed consent orally. The information of participants was kept confidential and anonymous throughout the study. The information gathered in the course of the study was only to be used for academic and research purposes.

Study Instrument

A structured questionnaire was used to gather data, which was designed with the objectives of the study and from literature.

The questionnaire was divided into three parts:

Section I: Demographic Information

This section collected information regarding:

- Age
- Gender
- Occupation
- Residential details

Section II: Risk Assessment Questionnaire

This section assessed participants' risk factors related to hypertension and diabetes mellitus, including:

- Physical activity habits
- Dietary practices
- Smoking and alcohol consumption
- Presence of disease-related symptoms
- Previous diagnosis of hypertension
- Previous diagnosis of diabetes mellitus
- Medication use

Section III: Awareness Assessment Questionnaire

A pre-test and post-test questionnaire comprising ten multiple-choice questions was used to evaluate awareness regarding:

- Symptoms of hypertension
- Symptoms of diabetes mellitus
- Dietary restrictions
- Normal blood pressure values
- Disease complications
- Role of exercise
- Importance of dietary modifications
- Medication adherence

Scoring Procedure

Each correct response was awarded two marks, while incorrect responses received zero marks.

- Correct answer = 2 marks

- Incorrect answer = 0 marks

The maximum attainable score was 20 marks.

Awareness levels were categorized as follows:

Score Range	Awareness Level
0–6	Poor
8–12	Moderate
14–16	Good
18–20	Excellent

Educational Intervention

Following completion of the pre-test assessment, participants received a structured nutrition education intervention.

The educational session included information regarding:

Hypertension

- Definition
- Causes
- Risk factors
- Symptoms
- Complications
- Prevention
- Dietary management

Diabetes Mellitus

- Definition
- Causes
- Risk factors
- Symptoms
- Complications
- Prevention
- Dietary management

Dietary Recommendations

Participants were educated regarding:

- Reduction of salt intake
- Limitation of sugar and sweets
- Avoidance of fried and processed foods
- Increased consumption of fruits and vegetables
- Consumption of whole grains
- Weight management
- Regular physical activity

Educational Method

Poster presentation was selected as the primary educational tool because of its simplicity, visual appeal, and effectiveness in communicating health-related information.

Interactive discussions were conducted alongside poster presentations to facilitate understanding and encourage participant engagement.

Study Procedure

The study was conducted in the following stages:

Stage I: Baseline Survey

Participants completed demographic and risk assessment questionnaires.



Stage II: Pre-Test Assessment

Participants' baseline knowledge regarding hypertension and diabetes mellitus was assessed using the structured awareness questionnaire.

Stage III: Educational Intervention

Nutrition education was provided through posters and verbal explanations covering disease prevention and dietary management.

Stage IV: Post-Test Assessment

Following the educational intervention, the same awareness questionnaire was administered to assess changes in participant knowledge.

Outcome Measures

Primary Outcome

- Improvement in awareness scores following the nutrition education intervention.

Secondary Outcomes

- Identifying lifestyle-related risk factors.
- Evaluation of the initial knowledge about hypertension and diabetes mellitus.
- Assessment of participants' knowledge and understanding of dietary practices.

Statistical Analysis

The data were fed into the computer on Microsoft Excel and analyzed descriptively.

The following statistical measures were used:

- Frequency
- Percentage
- Mean
- Standard deviation
- Confidence interval

The mean pre-test score was 11.06 ± 5.45 , while the mean post-test score increased to 16.46 ± 3.74 . The average awareness score improved by 5.40 points following the educational intervention, indicating enhanced participant knowledge regarding hypertension and diabetes mellitus.

Results

Participant Characteristics

A total of 30 adults participated in the study. The age of participants ranged from 18 to 50 years. Among the participants, 13 (43.3%) belonged to the age group of 18–35 years, whereas 17 (56.7%) belonged to the age group of 36–50 years. The study population consisted of an equal distribution of males and females (50% each).

Table 1. Demographic Characteristics of Participants (n = 30)

Variable	Category	Frequency (n)	Percentage (%)
Age Group	18–35 years	13	43.3
	36–50 years	17	56.7
Gender	Male	15	50.0
	Female	15	50.0



The study revealed that most of the subjects were middle-aged (45-54 years), and that these represent a high-risk group for hypertension and diabetes mellitus.

Assessment of Lifestyle-Related Risk Factors

The risk assessment questionnaire assessed participants' lifestyle habits and disease-related risk factors.

Table 2. Lifestyle Characteristics of Participants

Variable	Response	Frequency (n)	Percentage (%)
Regular Exercise	Yes	10	33.3
	No	20	66.7
Balanced Diet	Yes	6	20.0
	No	24	80.0
Smoking/Alcohol Consumption	Yes	5	16.7
	No	25	83.3

The majority of participants reported lack of regular physical activity and poor dietary practices, both of which are recognized risk factors for hypertension and diabetes mellitus.

Prevalence of Hypertension and Diabetes Mellitus

Participants were questioned regarding previous diagnosis of hypertension and diabetes mellitus.

Table 3. Disease Status of Participants

Condition	Yes n (%)	No n (%)
Hypertension	9 (30.0)	21 (70.0)
Diabetes Mellitus	5 (16.7)	25 (83.3)

The findings indicate that nearly one-third of participants had hypertension, while approximately one-sixth had diabetes mellitus.

Baseline awareness regarding hypertension and diabetes mellitus was assessed before the educational intervention. The results demonstrated varying levels of knowledge among participants.

Pre-Test Awareness Assessment

Table 4. Distribution of Pre-Test Awareness Levels

Awareness Level	Score Range	Frequency (n)	Percentage (%)
Poor	0-6	6	20.0
Moderate	8-12	13	43.3
Good	14-16	8	26.7



Excellent	18–20	3	10.0
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The baseline awareness among the participants was moderate with a mean pre-test score of 11.06 ± 5.45 . A 95% confidence interval for the mean pre-test score was (9.10, 13.01), indicating that the true meaning of the population of pre-test scores is likely to be within this interval.

Educational Intervention

After the baseline was taken, participants had a nutrition education session that used the methods of poster presentation and interactive discussion. The teaching material covered:

- Hypertension and diabetes mellitus, and its symptoms
 - Identify the risk factors of these diseases
- Follow dietary guidelines and suggestions.

- The significance of exercise to health.
- Why physical activity is important for health.
- The disease can be prevented by avoiding complications.
- Disease complications can be prevented.
- Lifestyle modification strategies

The participants actively engaged in the discussions and showed interest in learning about disease prevention and management.

Post-Test Awareness Assessment

The participants answered the same questionnaire after the educational intervention was administered to evaluate if there were changes in the awareness levels.

Table 5. Distribution of Post-Test Awareness Levels

Awareness Level	Score Range	Frequency (n)	Percentage (%)
Poor	0–6	0	0.0
Moderate	8–12	4	13.3
Good	14–16	11	36.7
Excellent	18–20	15	50.0

The mean post-test score increased to 16.46 ± 3.74 , indicating a substantial improvement in awareness following the intervention.

The 95% confidence interval for the post-test score was 15.12–17.80.

Comparison of Pre-Test and Post-Test Scores

Table 6. Comparison of Awareness Scores Before and After Intervention

Parameter	Pre-Test	Post-Test
Sample Size (n)	30	30
Mean Score	11.06	16.46
Standard Deviation	5.45	3.74
Mean Difference	–	5.40



95% Confidence Interval	9.10–13.01	15.12–17.80
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The mean awareness score increased by 5.40 points following the nutrition education intervention, demonstrating improved participant knowledge regarding hypertension and diabetes mellitus.

Overall Effectiveness of the Educational Intervention

A clear shift toward higher awareness categories was observed following the educational intervention. The proportion of participants classified as having excellent awareness increased from 10.0% during the pre-test assessment to 50.0% during the post-test assessment. Simultaneously, the proportion of participants with poor awareness decreased from 20.0% to 0%.

The results indicate that the nutrition education using posters was effective in improving the nutrition knowledge of the participants in the following aspects:

- Symptoms of hypertension, diabetes mellitus
- Dietary management practices Lifestyle modifications
- Disease prevention strategies
- Discuss the significance of having a regular exercise routine and eating well.
- Talk about regular exercise and healthy eating.

The findings show that community-based education interventions can be a crucial tool in efforts to increase awareness and enhance healthful lifestyles among adults.

DISCUSSION

The objectives of this study were: Measures the awareness of diet's role in hypertension and

diabetes mellitus among adults and evaluate the effect of the Community Nutrition Education intervention. The findings revealed that participants in the study had differing levels of knowledge at the beginning and that education increased their understanding of the symptoms of disease, risk factors, diet and prevention. Hypertension and diabetes mellitus are non-communicable diseases that are serious public health issues worldwide. These are becoming more common due to increased urbanization, physical inactivity, poor nutrition, obesity, and smoking/drinking. The results of this study are in accordance with the studies that suggest low awareness of these conditions and poor lifestyle practices contribute significantly to the prevalence of these conditions, especially in developing countries such as India. The Demographic analysis showed that most of the participants belonged to the age group of 36 to 50 years. This is of interest because people of older age groups are at higher risk for hypertension and diabetes mellitus. A few studies in India have reported higher prevalence of these conditions in the middle and older aged groups. This indicates that targeting these age groups for health promotion interventions is likely to have greatest impact because they have the highest risk of developing the chronic diseases and early diagnosis and prevention may result. Evaluation of lifestyle habits showed that a majority of the study subjects were not engaged in any physical activity or not taking a balanced diet. Evidence from global studies indicates that physical inactivity and poor food choice are responsible contributors to the development of hypertension, diabetes mellitus, obesity and other cardiovascular-related disorders. Being physically inactive and having unhealthy eating patterns can



contribute to weight gain, insulin resistance, high blood pressure and metabolism issues, and chronic conditions. Most of the study participants (30.0%) have a history of hypertension while 16.7% have a history of diabetes mellitus. This indicates that there is a substantial prevalence of chronic diseases in this community and that prevention of these diseases is needed. These findings do not differ from community studies conducted in other parts of India and are similar to the global burden of lifestyle related chronic diseases in the present day. The pre-test scores of knowledges and awareness of hypertension and diabetes mellitus revealed moderate level among the study respondents. Many of the participants were not familiar with the symptoms, complications, diet restrictions and prevention of these conditions. These results are consistent with previous studies that indicated that individuals' knowledge of chronic disease and health education in general is low. In the absence of good awareness, prevention and management of chronic diseases are difficult. The greatest result of this study was the cheerful outlook towards awareness of hypertension and diabetes mellitus during intervention. The mean score for awareness was significantly higher after than before the intervention (11.06 ± 5.45 pre-intervention, 16.46 ± 3.74 post-intervention). Overall, the average increase was 5.40 points. Furthermore, participants whose awareness score was exceedingly high improved, and no participant had a low level of awareness after the intervention. This improvement can imply that the educational intervention has worked for the participant to raise his/her awareness of hypertension and diabetes mellitus. This effect may be linked to the poster presentation and discussion that may be beneficial for participants to learn more about the topic. Posters and discussion groups can be effective tools for raising awareness about health issues as they can convey key health messages regarding disease prevention,

dietary habits and behavior change. There is a benefit of using posters as they are good at grabbing people's attention and then using the discussion to clear up misunderstandings and to solidify the understanding. As such, the usage of educational materials for dietary education like posters and group discussion could be a factor that added to the high dietary awareness following the intervention. The educational intervention also led to an increase in dietary knowledge. The participants gained an understanding of the importance of reducing salt, sugar, processed foods, eating more fruits and vegetables and maintaining normal body weight. These findings are significant as nutrition education can prevent, treat and manage hypertension and diabetes mellitus. Increasing nutrition literacy in the community can lead to healthier eating and lifestyle habits and decrease the likelihood of developing non-communicable diseases like hypertension and diabetes mellitus. Our findings are consistent with another study of a community-based nutrition intervention, which was able to positively impact nutrition knowledge and nutrition behavior of its participants. Other research on health education in the community has also shown increases in the participants' knowledge of the signs and symptoms, causes, prevention, treatment and compliance with health care of diseases. Also, health educational interventions in community that are not expensive, easy to implement and easy to reach a large number of people at a time are considered as a good health educational strategy. These findings imply that nutrition and health literacy should be incorporated into community programs focused on the prevention of NCDs. The governments and health-care providers should constantly disseminate knowledge on the importance of healthy lifestyle among people like balanced diet, physical activity and early screening of health to prevent and control hypertension and diabetes



mellitus. We were limited in our study in a number of ways. Our results might not be generalizable due to the small number of students and the single setting of our study. Furthermore, the effect of the intervention only on the knowledge and awareness of hypertension and diabetes mellitus was evaluated and the clinical health status of the participants (such as blood pressure level, blood glucose level, body mass index and etc.) were not monitored. Further research with larger group size and multi-site designs with longer follow-up is encouraged to measure the long-term effects of education on behavior change and to assess the effects on clinical parameters. In summary, our study revealed that community-based nutrition education can be a successful intervention to enhance public knowledge and awareness of hypertension and diabetes mellitus. Community-based health education programs have the potential to increase awareness and knowledge, and to help with the primary prevention and self-management of these diseases.

CONCLUSION

The present study aimed to explore the awareness of adults on the role of diet in the hypertension and diabetes mellitus and determine the impact of nutrition education. The study concluded that adults had a moderately good score on the awareness related to diet and hypertension and diabetes mellitus and there is scope for improvement. There was lack of awareness about the symptoms, complications of the disease, dietary control as well as its prevention. Post-test score was significantly higher with an increased awareness score from 11.06 ± 5.45 to 16.46 ± 3.74 with a mean improvement score of 5.40 in the participants following the nutrition education. The participants demonstrated better understanding of healthy eating, prevention of diseases and modification of lifestyle practices as well as

regular exercises. Thus, poster nutrition education is an effective and feasible way of increasing awareness of adults on diet and hypertension and diabetes mellitus. Nutrition education and intervention in the community may help in health promotion and in prevention of non-communicable diseases. This study may help in improving and increasing nutrition education and awareness programs to promote health and prevent lifestyle-related illnesses and non-communicable diseases.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

FUNDING STATEMENT

The authors declare that no external funding was received for conducting this study.

ETHICAL APPROVAL

The study was conducted in accordance with ethical principles for community-based research. Participation was voluntary, and informed consent was obtained from all participants before enrollment in the study. Confidentiality and anonymity of participant information were maintained throughout the study.



INFORMED CONSENT

Informed consent was obtained from all participants prior to participation in the study.

DATA AVAILABILITY STATEMENT

The data used and analyzed during the current study are available from the corresponding author upon reasonable request.

DECLARATION OF GENERATIVE AI USE

During the preparation of this manuscript, generative artificial intelligence tools were used solely for language improvement and grammatical refinement. The authors carefully reviewed and edited the content and take full responsibility for the accuracy, integrity, and originality of the manuscript.

Author Contributions

All authors contributed to the study conception, data collection, educational intervention, analysis, manuscript preparation, and final approval of the manuscript.

Data Availability Statement

The data used and analyzed during the current study are available from the corresponding author upon reasonable request.

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