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Effectiveness of nutrition education in prevention and management of coronary heart disease risk factors

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Abstract

Coronary heart disease (CHD) remains one of the leading causes of morbidity and mortality worldwide. Lifestyle-related risk factors such as unhealthy dietary habits, obesity, physical inactivity, smoking and hypertension contribute significantly to the development of CHD. Nutrition education has emerged as an effective strategy for modifying behavioural risk factors and improving cardiovascular health. The present study was undertaken to assess the effectiveness of behaviour-oriented nutrition education on the management of modifiable risk factors of coronary heart disease among adults. The study was conducted in selected rural and semi-urban areas of Assam involving 200 respondents in the age group of 35-60 years. Nutrition education interventions were carried out for three months through lectures, demonstrations, group discussions and distribution of educational materials. The findings revealed significant improvement in nutrition knowledge, dietary behaviour and lifestyle practices after intervention. Mean knowledge score increased from 11.42 ± 3.15 to 19.76 ± 2.84 . Reduction in average body mass index, waist circumference and systolic blood pressure was also observed. Consumption of fruits, green leafy vegetables and fibre-rich foods increased while intake of fried foods, visible fats and excess salt declined significantly. The paired t-test indicated significant differences between pre-and post-intervention values at 5 percent level of significance. The study concluded that behaviour-oriented nutrition education can play a vital role in the management of modifiable risk factors associated with coronary heart disease and should be integrated into community health programmes for prevention of cardiovascular diseases.

Keywords: Coronary heart disease, nutrition education, modifiable risk factors, behaviour change, cardiovascular health, dietary intervention

Introduction

Coronary heart disease (CHD) has become a major public health concern globally due to rapid lifestyle transitions, urbanization and unhealthy dietary practices. According to the World Health Organization (2023) ^[10], cardiovascular diseases account for nearly 17.9 million deaths annually worldwide. In India, increasing prevalence of obesity, hypertension, diabetes and sedentary lifestyle has significantly contributed to the burden of coronary heart disease. Modifiable risk factors such as obesity, hypertension, dyslipidaemia, smoking, excessive consumption of saturated fats and low physical activity are strongly associated with CHD (Jeemon *et al.*, 2021) ^[7]. Dietary patterns characterized by high intake of saturated fats, refined carbohydrates, processed foods and excess sodium increase the risk of hypertension and dyslipidaemia, thereby contributing to coronary heart disease (Gao *et al.*, 2025) ^[4].

Nutrition education is considered an important intervention strategy for promoting healthy eating behaviour and improving cardiovascular health outcomes. Behaviour-oriented nutrition education programmes help individuals understand the relationship between diet and disease and motivate them to adopt healthier lifestyles (Borbora *et al.*, 2008; Sharma and Mahajan, 2021) ^[2, 9]. Recent studies have also demonstrated that nutrition counselling combined with behavioural intervention significantly improves dietary adherence and cardiovascular risk reduction (Kaihara *et al.*, 2023) ^[8]. According to Gopalan *et al.*, (2019) ^[6], balanced diets rich in protective foods such as fruits, vegetables, pulses and whole grains play an important role in maintenance of cardiovascular health. Indian diets often contain excessive visible fats, sodium and calorie-dense foods which increase the risk of obesity, hypertension and coronary artery disease.

In Assam and other North-Eastern states, changing food habits, increased intake of processed foods and reduced physical activity have contributed to rising incidences of hypertension and obesity. Therefore, community-based nutrition education programmes are essential for promoting healthy lifestyles and preventing coronary heart disease. However, limited community-based studies have examined the effectiveness of nutrition education interventions in this region. Keeping these aspects in view, the present study was undertaken to assess the effectiveness of nutrition education in managing modifiable risk factors of coronary heart disease.

Methodology

The study was conducted in selected villages and semi-urban areas of Golaghat district of Assam. The study followed a quasi-experimental pre-test and post-test intervention research design. A total of 200 respondents in the age group of 35-60 years were selected through multistage random sampling technique. Individuals having at least one modifiable risk factor such as obesity, hypertension, sedentary lifestyle or unhealthy dietary habits were included in the study.

The following tools were used for collection of data:

1. Structured interview schedule
2. Nutrition knowledge questionnaire
3. Food frequency questionnaire
4. 24-hour dietary recall method
5. Anthropometric measurements
6. Blood pressure assessment

Nutrition education intervention

The intervention programme was conducted for a period of three months and included lectures on heart healthy diets, group discussions, cooking demonstrations, awareness on low-fat and low-saltdiets, physical activity promotion, distribution of pamphlets and educational leaflets. Data were analysed using frequency, percentage, mean, standard deviation, paired t-test and correlation analysis.

Results and Discussion

Socio-economic characteristics of respondents

The socio-economic characteristics of the respondents revealed that majority (41.00%) belonged to the age group of 46-55 years followed by 35-45 years (37.00%) and 56-60 years (22.00%). Male respondents constituted 54.00 percent while females accounted for 46.00 percent of the sample population. Majority of respondents were engaged in sedentary occupations and belonged to middle-income category. The findings indicate increasing vulnerability of middle-aged adults to cardiovascular risk factors due to sedentary lifestyle and unhealthy food habits. Similar demographic patterns were observed by Jeemon *et al.* (2021)^[7] in a cardiovascular risk reduction study conducted in India.

Educational status indicated that 44.00 percent respondents were graduates and above, whereas 32.50 percent had completed higher secondary education. Despite satisfactory literacy levels, awareness regarding heart-healthy dietary practices and cardiovascular risk factors was found to be inadequate during baseline assessment. Occupational profile indicated that 63.00 percent respondents were engaged in sedentary occupations including office work, small business and household activities with minimal physical exertion.

Sedentary occupational patterns combined with reduced physical activity significantly increase susceptibility to obesity, hypertension and cardiovascular disorders. Similar findings were reported by Jeemon *et al.* (2021)^[7], who observed increased prevalence of cardiovascular risk factors among middle-aged sedentary adults in India.

The monthly family income of respondents varied considerably, with 48.50 percent belonging to middle-income category. The findings further revealed that a substantial proportion of respondents had irregular meal patterns and low engagement in structured physical activity. Such behavioural transitions are becoming increasingly common in urban and semi-urban populations and are strongly associated with coronary heart disease risk. Similar socio-demographic patterns associated with increased cardiovascular risk have been reported in recent studies on coronary heart disease and lifestyle disorders.

Prevalence of modifiable risk factors among respondents

The baseline assessment revealed that several modifiable risk factors associated with coronary heart disease were prevalent among the respondents. About 61.50 percent respondents were overweight or obese according to WHO BMI classification. Central obesity based on waist circumference measurements was observed among 42.00 percent respondents. Blood pressure assessment indicated that 58.00 percent respondents had elevated systolic blood pressure levels, while 46.50 percent exhibited borderline or elevated diastolic blood pressure. Elevated blood pressure among middle-aged adults may be associated with excessive sodium intake, obesity, stress and low physical activity.

A considerable proportion of respondents reported unhealthy dietary habits including excessive consumption of visible fats, fried foods and low intake of fruits and vegetables in their daily diet. Nearly 53.00 percent consumed fried foods more than three times per week, whereas 76.00 percent reported excess salt intake. Consumption of fruits, fibre-rich foods and green leafy vegetables was inadequate among majority of respondents. Only 32.00 percent consumed fruits daily, whereas regular intake of whole grains was reported by merely 26.00 percent respondents. Physical inactivity was prevalent among 64.50 percent respondents. Lack of regular exercise combined with sedentary occupational habits may have contributed substantially to obesity and hypertension observed during baseline assessment.

These findings corroborate the observations of Gao *et al.* (2025)^[4], who emphasized that dietary transitions characterized by increased intake of processed foods, saturated fats and refined carbohydrates significantly contribute to coronary heart disease risk. Similar patterns have also been documented among Indian adults undergoing rapid nutritional and lifestyle transition.

Nutrition knowledge of respondents before and after intervention

One of the major objectives of the study was to evaluate the effectiveness of nutrition education in improving awareness regarding coronary heart disease and healthy dietary practices. Table 1 presents the distribution of respondents according to nutrition knowledge before and after intervention. The findings clearly demonstrate substantial improvement in nutrition knowledge after implementation of the educational intervention. Prior to intervention, only

12.50 percent respondents possessed high Level of knowledge regarding cardiovascular risk factors, healthy diets and preventive practices. However, following the intervention, majority (61.50%) shifted to the high Level of category.

Table 1: Distribution of respondents according to nutrition knowledge score before and after intervention (n = 200)

Category of knowledge	Pre-test	Post-test
Low Level of knowledge	90 (48.50)	20 (10.00)
Medium Level of knowledge	78 (39.00)	57 (28.50)
High Level of knowledge	25 (12.50)	125 (61.50)

Figures in the parentheses are percentages

The mean nutrition knowledge score increased significantly from 11.42 ± 3.15 during pre-test to 19.76 ± 2.84 during post-test phase. The calculated paired t-value was found statistically significant at 5 percent probability level, indicating strong effectiveness of the nutrition education programme. The improvement in knowledge may be attributed to repeated exposure to educational sessions, practical demonstrations, visual learning materials and personalized counselling provided during the intervention period. The use of culturally appropriate examples and locally available foods may also have enhanced understanding and retention of information. Nutrition education not only improved awareness regarding coronary heart disease but also helped respondents understand the relationship between unhealthy diets, obesity, hypertension and cardiovascular disorders. Increased awareness regarding the role of dietary fats, sodium, fibre and antioxidants in heart health was evident during post-intervention interactions.

These findings are in close agreement with the observations of Sharma and Mahajan (2021) ^[9], who reported that structured nutrition education significantly improves awareness and preventive practices related to cardiovascular diseases. Kaihara *et al.* (2023) ^[8] also observed improved dietary compliance and nutrition literacy among coronary artery disease patients following nutrition counselling and smart phone-assisted educational intervention.

Dietary behaviour changes following nutrition education

Nutrition education intervention resulted in significant improvement in dietary behaviour and lifestyle practices among respondents. Table 2 presents changes in dietary practices before and after intervention. A remarkable increase in healthy dietary practices was observed following intervention. Daily fruit consumption increased from 32.00 percent to 68.50 percent, while intake of green leafy vegetables increased from 41.50 percent to 79.00 percent. Respondents reported improved understanding regarding the protective role of antioxidants, dietary fibre and micronutrients in prevention of cardiovascular diseases.

Table 2: Changes in dietary behaviour of respondents after intervention

Dietary behaviour	Pre-test	Post-test
Daily fruit consumption	64 (32.00)	137 (68.50)
Green leafy vegetable intake	83 (41.50)	158 (79.00)
Whole grain consumption	52 (26.00)	115 (57.50)
Frequent fried food consumption	144 (72.00)	77 (38.50)
Visible fat intake	139 (69.50)	66 (33.00)
Excess salt intake	132 (66.00)	58 (29.00)
Sugary beverage consumption	97 (48.50)	39 (19.50)
Regular breakfast consumption	76 (38.00)	149 (74.50)
Regular physical activity	56 (28.00)	123 (61.50)

Figures in the parentheses are percentages

Consumption of fried foods, visible fats and sugary beverages declined considerably during post-intervention assessment. This suggests that nutrition education effectively influenced food choices and encouraged healthier eating behaviour. Respondents became more conscious regarding portion control, cooking methods and avoidance of excessive oil and salt during meal preparation. The increase in regular breakfast consumption and whole grain intake further indicates improved meal planning and dietary awareness. Behavioural changes observed in the present study may have been facilitated by repeated counselling sessions, practical demonstrations and interactive group discussions conducted during intervention. Regular physical activity also improved substantially following intervention. The percentage of respondents engaging in daily walking, yoga or moderate exercise increased from 28.00 percent to 61.50 percent. Increased awareness regarding the importance of physical activity in weight management and blood pressure control may have motivated respondents to adopt healthier lifestyles.

The findings are supported by Bae *et al.* (2021) ^[1], who reported significant improvement in dietary adherence and physical activity following mobile health-based behavioural intervention among cardiovascular patients. Similar improvements in dietary quality and lifestyle modification were documented by Deka *et al.* (2022) ^[3] among coronary artery disease patients undergoing combined nutrition education and exercise training

Effect of intervention on anthropometric parameters

Anthropometric indicators are important predictors of coronary heart disease risk. The present study assessed changes in body mass index and waist circumference before and after intervention. The observation of the study are presented in Table 3.

Table 3: Anthropometric changes among respondents after intervention

Parameter	Pre-test (Mean $\pm$ SD)	Post-test (Mean $\pm$ SD)
Body weight (kg)	74.6 $\pm$ 8.4	70.8 $\pm$ 7.5
Body Mass Index (kg/m ²)	28.4 $\pm$ 2.6	26.9 $\pm$ 2.3
Waist circumference (cm)	97.6 $\pm$ 8.2	93.1 $\pm$ 7.4

A gradual reduction in body weight, BMI and waist circumference was observed after three months of nutrition education and lifestyle modification programme. Mean BMI reduced from 28.4 kg/m² to 26.9 kg/m² indicating improvement in obesity status among respondents. The reduction in waist circumference suggests decreased central adiposity, which is strongly associated with coronary heart disease risk. Increased physical activity and adoption of low-fat dietary practices may have contributed to these positive changes. Although the duration of intervention was relatively short, measurable improvements in obesity indicators were observed, suggesting that even short-term nutrition education programmes can positively influence anthropometric status when combined with behavioural counselling. These findings are in accordance with the observations of Deka *et al.* (2022) [3], who reported significant reductions in BMI and waist circumference following dietary education and exercise intervention among patients with coronary artery disease.

Changes in physiological parameters

Physiological parameters including blood pressure and lipid profile were assessed to determine cardiovascular risk reduction following intervention and presented in Table 4. Significant improvements in physiological indicators related to cardiovascular health were also observed following intervention.

Table 4: Changes in physiological parameters after intervention

Parameter	Pre-test (Mean ± SD)	Post-test (Mean ± SD)
Systolic BP (mmHg)	146.5±10.4	134.2±9.1
Diastolic BP (mmHg)	92.6±6.8	86.4±5.7
Total cholesterol (mg/dL)	214.4±24.5	198.6±20.3
LDL cholesterol (mg/dL)	142.8±18.2	131.5±15.4
HDL cholesterol (mg/dL)	38.5±5.4	42.6±5.9

The reduction in systolic and diastolic blood pressure observed after intervention may be associated with decreased sodium intake, improved body weight management and enhanced physical activity among respondents. Reduction in serum cholesterol and LDL cholesterol further indicates improved dietary quality and reduced consumption of saturated fats. The increase in HDL cholesterol levels is particularly encouraging because HDL cholesterol is considered protective against cardiovascular diseases. Increased intake of fibre-rich foods, fruits and vegetables may have contributed to improved lipid profile among respondents. The findings demonstrate that nutrition education intervention can positively influence physiological risk factors associated with coronary heart disease. Similar findings were reported by Gao *et al.* (2025) [4], who emphasized the beneficial effects of nutritional intervention on lipid metabolism and cardiovascular outcomes.

Relationship between nutrition knowledge and behavioural modification

Diet is an important modifiable risk factor associated with CAD. The Mediterranean Diet (MD), with its anti-inflammatory properties, is protective against CAD. Traditional Indian diets have several anti-inflammatory ingredients similar to MD (Gosh *et al.*, 2025) [5]. Correlation analysis was performed to examine the relationship between

nutrition knowledge and healthy dietary behaviour. Correlation analysis revealed significant positive relationship between nutrition knowledge and healthy dietary behaviour among respondents.

Table 5: Correlation between nutrition knowledge and healthy dietary practices

Variables	Correlation coefficient (r)
Fruit intake	0.62*
Physical activity	0.54*
Fried food intake	-0.49*
BMI	-0.45*

*Significant at 5% level

Positive correlation between nutrition knowledge and healthy dietary practices suggests that increased awareness significantly influenced behavioural modification among respondents. Negative association between nutrition knowledge and BMI indicates that respondents with better nutrition awareness were more likely to maintain healthier body weight. The findings highlight the importance of educational interventions in influencing dietary choices and lifestyle behaviour. Nutrition education may therefore serve as an effective preventive strategy for reducing modifiable cardiovascular risk factors at community level. The findings highlight the importance of educational intervention in influencing behavioural determinants of coronary heart disease.

Overall effectiveness of nutrition education intervention

The present study demonstrated that behaviour-oriented nutrition education significantly improved knowledge, dietary behaviour and cardiovascular health indicators among adults. The intervention programme successfully motivated respondents to adopt healthier food choices and engage in physical activity. The educational approach combining lectures, demonstrations, counselling and printed educational materials proved effective in promoting sustainable behavioural changes. The findings support the growing evidence that nutrition education should be integrated into community-based cardiovascular disease prevention programmes. The findings of the present study are in close agreement with the observations of Borbora *et al.* (2008) [2], who reported significant improvement in knowledge and management of modifiable risk factors of coronary heart disease following nutrition education intervention. Their study highlighted the importance of dietary counselling and awareness programmes in promoting cardiovascular health among adults. Incorporation of culturally appropriate and locally available foods in dietary counselling may further enhance long-term adherence among Indian populations.

Conclusion

The study concluded that nutrition education is an effective strategy for management of modifiable risk factors associated with coronary heart disease. Behaviour-oriented educational interventions can significantly improve dietary practices, physical activity and cardiovascular health indicators among adults. The findings emphasize the importance of integrating nutrition education into community health programmes for prevention and management of coronary heart disease. Behaviour-oriented nutrition education interventions may therefore serve as

effective strategies for reducing the burden of cardiovascular diseases in both rural and urban populations.

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