

Impact of Nutrition Education on Food Consumption Pattern of Tribal Adolescent Girls in Mayurbhanj, Odisha

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Abstract: Adolescence is a critical period of rapid growth and development that requires adequate nutrition to support physical, cognitive and reproductive health. Tribal adolescent girls are particularly vulnerable to poor dietary intake due to socio-economic disadvantages, limited nutritional knowledge, food insecurity and restricted access to healthcare services. Nutrition Education has emerged as an effective intervention strategy for improving dietary practices and promoting healthy food choices among adolescents. The study aimed to assess the impact of nutrition education on the food consumption pattern of the tribal adolescent girls. A quasi-experimental pre-test and post-test control group design was adopted. A total of 300 tribal adolescent girls aged 15-19 years from Baripada & Samakhunta blocks of Mayurbhanj district, Odisha were selected and equally divided into control (n=150) and experimental (n=150) groups. Baseline information on socio-economic characteristics and food consumption patterns was collected using a structured interview schedule. The experimental group received nutrition education through lectures, demonstrations, group discussions, posters and leaflets while the control group received no intervention. Data were analysed using descriptive statistics and paired t-tests. The findings revealed that there was significant improvements in the consumption of cereals and millets (from 170.25±9.17g to 195.28±12.15g; t=19.538), pulses and legumes (48.20±5.29g to 58.93±8.15g; t=13.661), milk and meat products (18.41±50.75g to 429.61±38.25g; t=12.205), vegetables and fruits (227.02±55.41g to 262.98±37.02g; t=6.808) and fats & sugars (12.06±1.36g to 32.18±1.85g; t=101.144) among the experimental group following nutrition education (p<0.01). No significant changes were observed in the control group. Nutrition education significantly improved the food consumption pattern of tribal adolescent girls. The study highlights the importance of integrating nutrition education into school and community-based programmes to promote healthy dietary practices among tribal adolescents.

Keywords: Nutrition Education, Food Consumption Pattern, Tribal, Adolescent Girls, Dietary Diversity, Nutritional Awareness

1. Introduction

Adolescence is a crucial stage of life characterized by rapid physical growth, psychological development and increased nutritional requirements. The term adolescence is derived from the Latin word "adolescere," which means "to grow, to mature, to emerge, or to achieve identity." The WHO defines adolescent girls as individuals aged 10 to 19 years, and who requires additional dietary support to facilitate rapid growth in height and weight, as well as psychological and sexual maturation (Islam *et al.*, 2015). Approximately one-fifth of the global population comprises adolescent girls, with 84% residing in developing nations (Raghunatha *et al.*, 2017). The National Youth Policy 2000 states that around 21.4 percent of India's overall population comprises adolescent girls, while Kaur *et al.* (2017) suggest this figure is 22.8 percent. Patanwar & Sharma (2013) in their study shown that around 1.2 billion teenage girls exist globally, with this figure rising daily.

Adequate nutrition during this period is essential for attaining optimal growth, improving learning capacity, strengthening immunity and preparing girls for healthy motherhood in later life (World Health Organization [WHO], 2023). Poor dietary practices during adolescence may lead to undernutrition, micronutrient deficiencies, impaired cognitive development and adverse reproductive outcomes. Adolescent girls are more susceptible to malnutrition, stunting, and anaemia due to inconsistent eating patterns, insufficient nutritional awareness, and inadequate dietary habits (Islam *et al.*, 2015).

Consequently, growth is hindered, potentially constituting a significant public health issue globally.

India has one of the largest adolescent populations in the world, with adolescent girls constituting a nutritionally vulnerable group. The situation is particularly concerning among tribal communities, where poverty, food insecurity, low literacy levels, traditional dietary practices and limited access to nutrition information contribute to poor nutritional status (UNICEF, 2019). Odisha is home to a substantial tribal population and Mayurbhanj district has the highest concentration of tribal communities in the state. Despite the rich biodiversity and availability of indigenous foods, dietary inadequacies and poor food choices remain common among tribal adolescent girls.

Nutrition Education is a behaviour change strategy that enhances knowledge, attitudes and practices related to healthy eating. Evidence suggests that nutrition education interventions improve dietary diversity, food consumption patterns and nutritional outcomes among adolescents (Rathi *et al.*, 2017; Nyma *et al.*, 2023). Similarly, Yazew *et al.*, (2024) reported significant improvements in dietary diversity and healthy eating behaviours among adolescent girls following nutrition education interventions. However, limited research has examined the effectiveness of nutrition education among tribal adolescent girls in Odisha. Therefore, the present study was undertaken to evaluate the impact of nutrition education on the food consumption pattern of tribal adolescent girls in Mayurbhanj district of Odisha.

2. Methodology

As per the objectives of the study the suitable methodology was adopted along with descriptive statistics.

Research Design

The study employed a quasi-experimental pre-test and post-test control group design to assess the effectiveness of nutrition education on food consumption patterns.

Locale of the Study

The study was conducted in selected tribal dominated Baripada & Samakhunta blocks of Mayurbhanj district in the state of Odisha.

Sample and Sampling Technique

A total of 300 tribal adolescent girls aged 15-19 years were selected using purposive and random sampling techniques. The respondents were equally distributed into control (n=150) and experimental (n=150) groups.

Inclusion Criteria

- Tribal adolescent girls aged 15-19 years
- Residents of the selected study area
- Willing to participate in the study

Exclusion Criteria

- Adolescents suffering from chronic illnesses or severe health conditions
- Participants unavailable during the intervention or follow-up period.

Data Collection Tool

Data on socio-economic attributes and food consumption pattern were collected using a structured interview schedule. Dietary intake of major food groups was recorded before and after intervention.

Nutrition Education Intervention

The experimental group received nutrition education focusing on balanced diet, RDA (Recommended Dietary Allowances), correct cooking practices, dietary guidelines, low cost ready to eat recipes, importance of hygiene and environmental sanitation, nutritional problems during adolescence, government programmes related to adolescent girls and effect of teenage pregnancy. Educational strategies included lectures, demonstrations, group discussions, audio-visual presentation, charts, posters, leaflets and food plate method. The intervention was conducted in different sessions. The control group did not receive any nutrition education during the study period. A follow-up was continually kept in contact through telephonic call or home-visits. The post intervention data was assessed after 6 months of intervention.

Statistical Analysis

The collected data were coded, tabulated and analysed using descriptive statistics such as frequency, percentage, mean and standard deviation. Paired t-tests were used to determine the significance of differences between pre- and post-intervention food consumption patterns. Statistical significance was considered at the 1 percent level ($p < 0.01$)

3. Results

The results of the study are presented as under following headings:

Table 1: Socio-economic profile of the selected respondents, (N=300)

| Particulars | Control (n=150) | | Experimental (n=150) | | Total (N=300) | |
|---------------------------|-----------------|------|----------------------|------|---------------|------|
| | f | % | f | % | f | % |
| Age | | | | | | |
| 15 years | 25 | 16.7 | 21 | 14.0 | 46 | 15.3 |
| 16 years | 45 | 30.0 | 42 | 28.0 | 87 | 29.0 |
| 17 years | 55 | 36.7 | 64 | 42.7 | 119 | 39.7 |
| 18 years | 20 | 13.3 | 19 | 12.7 | 39 | 13.0 |
| 19 years | 05 | 3.3 | 04 | 2.7 | 09 | 3.0 |
| Tribe | | | | | | |
| Santal | 72 | 48.0 | 97 | 64.7 | 169 | 56.3 |
| Kolha | 09 | 6.0 | 17 | 11.3 | 26 | 8.7 |
| Bathudi | 28 | 18.7 | 00 | 00 | 28 | 9.3 |
| Bhumija | 37 | 24.7 | 25 | 16.7 | 62 | 20.7 |
| Gond | 04 | 2.7 | 11 | 7.3 | 15 | 5.0 |
| Educational Status | | | | | | |
| Continuing | 129 | 86.0 | 125 | 83.3 | 254 | 84.7 |
| Not continuing | 21 | 14.0 | 25 | 16.7 | 46 | 15.3 |
| Educational Level | | | | | | |
| Matriculation | 30 | 23.3 | 17 | 13.6 | 47 | 18.5 |
| Intermediate | 88 | 68.2 | 99 | 79.2 | 187 | 73.6 |
| Graduation | 11 | 8.5 | 09 | 7.2 | 20 | 7.9 |
| Religion | | | | | | |
| Hindu | 138 | 92.0 | 120 | 80.0 | 258 | 86.0 |
| Christian | 12 | 8.0 | 30 | 20.0 | 42 | 14.0 |
| Marital Status | | | | | | |
| Married | 15 | 10.0 | 12 | 8.0 | 27 | 9.0 |
| Unmarried | 135 | 90.0 | 138 | 92.0 | 273 | 91.0 |
| Family Type | | | | | | |
| Joint | 101 | 67.3 | 108 | 72.0 | 209 | 69.7 |

| | | | | | | |
|--|-----|------|-----|------|-----|------|
| Nuclear | 49 | 32.7 | 42 | 28.0 | 91 | 30.3 |
| Family size | | | | | | |
| 2-4 members | 02 | 1.3 | 16 | 10.7 | 18 | 6.0 |
| 5-6 members | 88 | 58.7 | 94 | 62.7 | 182 | 60.7 |
| >6 members | 60 | 40.0 | 40 | 26.7 | 100 | 33.3 |
| No. of siblings | | | | | | |
| No sibling | 08 | 5.3 | 05 | 3.3 | 13 | 4.3 |
| 1-2 siblings | 45 | 30.0 | 91 | 60.7 | 136 | 45.3 |
| 3-4 siblings | 97 | 64.7 | 43 | 28.7 | 140 | 46.7 |
| >4 siblings | 00 | 00 | 11 | 7.3 | 11 | 3.7 |
| Parent's Education & Occupation | | | | | | |
| Father's Education | | | | | | |
| Illiterate | 32 | 21.3 | 28 | 18.7 | 60 | 20.7 |
| Under matric | 113 | 75.3 | 75 | 50.0 | 188 | 62.7 |
| Matric | 05 | 3.3 | 47 | 31.3 | 52 | 17.3 |
| Father's Occupation | | | | | | |
| Own business | 16 | 10.7 | 30 | 20.0 | 46 | 15.3 |
| Daily wage earner | 85 | 56.7 | 94 | 62.7 | 179 | 59.7 |
| Cultivator | 49 | 32.7 | 26 | 17.3 | 75 | 25.0 |
| Mother's Education | | | | | | |
| Illiterate | 25 | 16.7 | 103 | 68.7 | 128 | 42.7 |
| Under matric | 82 | 54.7 | 43 | 28.7 | 125 | 41.7 |
| Matric | 43 | 28.7 | 04 | 2.7 | 47 | 15.7 |
| Mother's Occupation | | | | | | |
| Daily wage earner | 31 | 20.7 | 10 | 6.7 | 41 | 13.7 |
| Cultivator | 38 | 25.3 | 20 | 13.3 | 58 | 19.3 |
| Domestic help | 21 | 14.0 | 09 | 6.0 | 30 | 10.0 |
| Homemaker | 60 | 40.0 | 111 | 74.0 | 171 | 57.0 |
| Family Income (Rs. /month) | | | | | | |
| 5000-15000 (Very low) | 86 | 57.3 | 87 | 58.0 | 173 | 57.7 |
| 15000-25000 (Low) | 64 | 42.7 | 63 | 42.0 | 127 | 42.3 |
| Family Land Holding Size | | | | | | |
| Landless | 43 | 28.7 | 48 | 32.0 | 91 | 30.3 |
| <1 hectares (Marginal) | 107 | 71.3 | 102 | 68.0 | 209 | 69.7 |

f indicates frequency, % indicates percentage

Table 1. presents the socio-economic profile of the respondents. A total of 300 tribal adolescent girls were included, comprising 150 each in the control and experimental groups. The majority of respondents were 17 years old (39.7%), belonged to the Santal tribe (56.3%), were continuing their education (84.7%), and were studying at the intermediate level (73.6%). Most participants were Hindu (86.0%), unmarried (91.0%), and belonged to joint families (69.7%). About 60.7 per cent had a family size of 5-6

members, while 46.7 per cent had 3-4 siblings. The majority of fathers (62.7%) and mothers (41.7%) had low educational level of below matriculation. Daily wage labour was the predominant occupation of fathers (59.7%), whereas most mothers were homemakers (57.0%). More than half of the families (57.7%) had a monthly income of Rs. 5,000-15,000 (Very low) and 69.7 per cent possessed marginal landholdings (<1 hectare).

Table 2: Impact of nutrition education on the food consumption pattern among respondents, (N=300)

| Food groups | Control (n=150) | | t-value | Experimental (n=150) | | t-value | RDI |
|----------------------------|------------------|-------------------|---------|----------------------|-------------------|-----------|---------|
| | Pre intervention | Post intervention | | Pre intervention | Post intervention | | |
| Cereals and millets (g) | 152.82±8.879 | 155.43±6.868 | 2.113NS | 170.250±9.173 | 195.28±12.147 | 19.538** | 300-350 |
| Pulses and legumes (g) | 45.520±6.550 | 44.220±7.306 | 1.623NS | 48.200±5.286 | 58.933±8.149 | 13.661** | 60-90 |
| Milk and meat products (g) | 301.160±34.963 | 305.94±64.995 | 1.509NS | 418.410±50.754 | 429.61±38.254 | 12.205** | 300 |
| Vegetables & Fruits | 123.420±10.681 | 122.480±7.374 | 0.955NS | 227.020±55.413 | 262.98±37.023 | 6.808** | 400 |
| Fats and sugars (g) | 10.069±1.654 | 10.266±1.267 | 1.358NS | 12.059±1.363 | 32.178±1.848 | 101.144** | 25-30 |

Values are Mean±SD #ICMR-NIN (2023) *Significant at 1% level of significance NS-Non significant

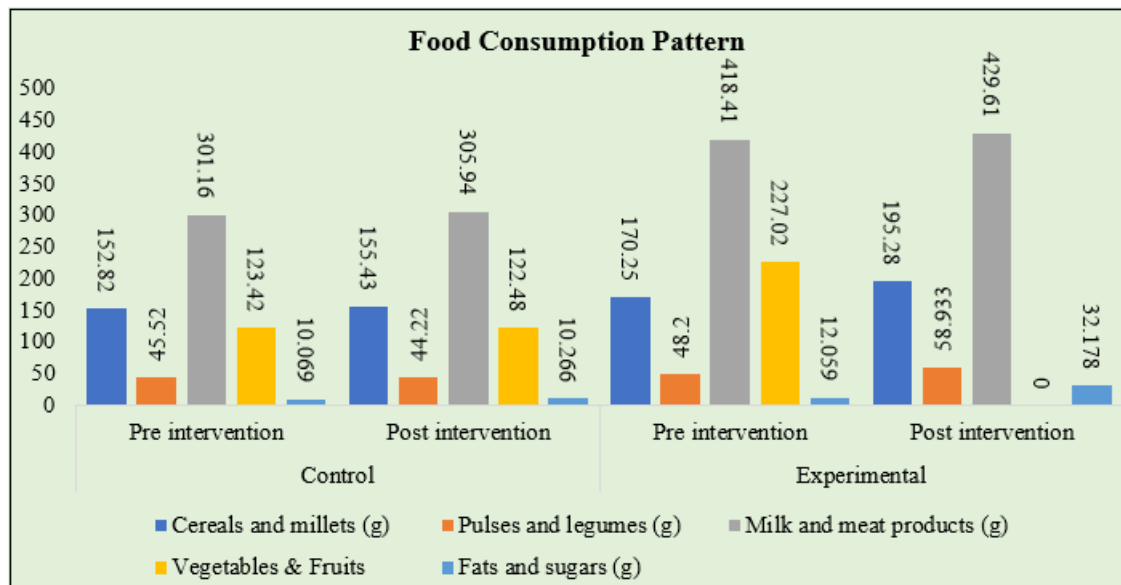


Figure 2: Average Daily Food Group's Consumption Pattern

The impact of nutrition education on food consumption pattern is presented in Table 2 and Figure 2. In the control group, no significant changes were observed in the consumption of cereals and pulses and legumes, milk and meat products, vegetables and fruits and fats and sugars after the intervention ($p > 0.01$). In contrast, the experimental group showed significant increase in the consumption of all five food groups following nutrition education ($p < 0.01$).

The mean intake of cereals and millets increased from $170.25 \pm 9.17g$ to $195.28 \pm 12.15g$ ($t = 19.538$), pulses and legumes from $48.20 \pm 5.29g$ to $58.93 \pm 8.15g$ ($t = 13.661$), milk and meat products from $418.41 \pm 50.75g$ to $429.61 \pm 38.25g$ ($t = 12.205$), vegetables and fruits from $227.02 \pm 55.41g$ to $262.98 \pm 37.02g$ ($t = 6.808$) and fats & sugars from $12.06 \pm 1.36g$ to $32.18 \pm 1.85g$ ($t = 101.144$). These findings indicate a positive effect of nutrition education on improving dietary intake among tribal adolescent girls.

4. Discussion

The present study demonstrated that nutrition education significantly improved the food consumption pattern of tribal adolescent girls in the experimental group, whereas no significant improvement was observed among the control group. The increase in consumption of cereals, pulses, milk and meat products, vegetables and fruits suggests enhanced awareness regarding balanced diets and the nutritional importance of diverse food groups during nutrition education intervention.

The findings are consistent with the study by Nyma *et al.*, (2023), which reported that school-based nutrition education significantly improved dietary diversity and increased the consumption of nutrient-rich foods among adolescent girls in Bangladesh. The authors concluded that nutrition education effectively promoted healthier dietary behaviours and food choices among adolescents.

Similarly, Yazew *et al.*, (2024) found that nutrition education based on the Health Belief Model significantly improved dietary diversity among adolescent school girls in Ethiopia.

The intervention group exhibited better food consumption practices and higher dietary diversity scores compared to the control group.

The results are further supported by community-based intervention studies in India, which reported significant improvements in dietary practices, fruit and vegetable consumption and nutritional efficacy among adolescents following nutrition education sessions. These studies highlighted the role of behaviour-change communication in promoting healthier food choices and improving nutritional status (Priyanshu *et al.*, 2024).

The observed improvement in the intake of vegetables, fruits, pulses and animal source foods among the experimental group is particularly important for tribal adolescent girls, who are vulnerable to nutrient deficiencies due to limited dietary diversity and socio-economic constraints. Evidence from adolescent nutrition studies in India (Shinde *et al.*, 2021) indicates that inadequate dietary diversity remains a major contributor to malnutrition and micronutrient deficiencies among adolescent girls, especially in tribal populations.

Overall, the findings suggest that nutrition education is an effective and sustainable strategy for improving food consumption patterns among tribal adolescent girls. Integrating nutrition education into school and community programmes may contribute substantially to better dietary practices and nutritional outcomes in this vulnerable population.

5. Conclusion

The findings of the study demonstrated that nutrition education significantly improved the food consumption pattern of tribal adolescent girls in Mayurbhanj district of Odisha. The experimental group showed significant increases in the consumption of cereals and millets, pulses and legumes, milk and meat products, vegetables and fruits and other nutrient-rich foods due to the impact of nutrition education intervention, whereas the control group exhibited no significant changes. The results indicated that nutrition

education can effectively influence dietary behaviour and promote healthier food choices among tribal adolescents. Therefore, nutrition education should be incorporated into school health programmes, adolescent development initiatives and community nutrition interventions to improve dietary diversity and nutritional well-being among tribal adolescent girls. Such interventions can play a vital role in reducing inter-generational malnutrition and supporting the overall health and development of tribal communities.

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