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A KAP Study on the Dietary Habits and Lifestyle Pattern of School-going Adolescents (13–17 years) of Kolkata and Post Intervention Analysis

Uttiya Jana*, Kritika Rathi

Abstract

Introduction: Diet and lifestyle patterns play a significant role on the quality of life of adolescents and it is a key time to address nutritional deficiencies to support adequate growth and foster sound dietary practices for the future. **Aims and Objectives:** This study aims to determine the dietary habits and lifestyle patterns and their impact on the quality of life on school going adolescents in Kolkata, West Bengal. **Methodology:** A survey was conducted among 400 respondents aged 13–17 years by a self-administered, semi-structured questionnaire, selected by purposive random sampling in different zones of Kolkata. An intervention program was also implemented through a "Nutrition Education Program" to raise awareness about healthier eating choices and better lifestyle habits along with the introduction of fiber rich snack to offer a healthier snack option. **Results and Discussion:** The findings revealed that dietary habits and lifestyle patterns are significantly interrelated. 62% adolescents showed increased screen time and affected by social media and societal influences, while 85% engaged in physical activities with adequate sleep. However, 27% showed lack of regular fiber intake along with high consumption of packaged snacks. Binge eating along with skipping meals were also observed among respondents. **Conclusion:** It can be concluded that the dietary habits and lifestyle pattern create absolute impact on the quality of life of adolescent with predominant gut health issues and the changes in the dietary habits and lifestyle pattern was observed in post-intervention reducing the clinical manifestation significantly.

Keywords: Adolescents, Binge-eating, Dietary habits, Gut health issues, Lifestyle pattern, Nutrition intervention, Screen time, Social media

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Introduction

The word "adolescence" is derived from the Latin verb "adolescere," which means "grow to maturity." It is a transitional phase that occurs between childhood and adulthood with accelerated physical, biochemical and emotional development.[1,2] In addition, during adolescence, the reproductive system develops, sexual maturation occurs, identity and gender roles are formed, along with the challenges pertaining to these developments.[3] Adolescence is a crucial period for developing healthy lifestyle choices, such as regular exercise and a balanced diet which have numerous advantages and can lead to better lifestyle pattern for upcoming adulthood along with the better academic results.[4,5] Adolescent dietary habits and lifestyle patterns are influenced by a variety of factors, leading to unhealthy behaviors.[6,7] A study conducted in India found that more than 50% of adolescents engage in sedentary habits, such as playing video games or listening to fast music, while <25% participate in beneficial daily activities, such as yoga or physical exercise.[8,9] Media consumption has a strong influence on their dietary choices and physical activity. For instance, in Chennai, 90% of adolescents reported eating snacks while watching TV and 82% purchased food products based on advertisements.[10] These unhealthy behaviors, combined with low physical activity levels, contribute to obesity, sleep disorders and other long-term health risks. Research also highlights the prevalence of substance abuse with 11% of adolescent boys and 1% of girls consuming alcohol, and 29% of boys and 4% of girls are smoking.[11,12] This early exposure to harmful substances can have serious mental and physical consequences, including addiction and the risk of diseases, such as schizophrenia in cannabis users.[13] Physical activity among adolescents is generally low. A study in Agartala showed that 73.6% of adolescents engage in moderate physical activity but only 1.4% participate in high-intensity exercises.[14,15] Similar trends were observed in other Indian cities, where outdoor sports, such as cricket and badminton, were the most popular activities, yet vigorous exercise was rare.[16] In addition, increased screen time is linked to a variety of negative outcomes. In Delhi, 25.59% of adolescent males and 5.79% of females exceeded recommended screen time, a habit correlated with poor sleep, psychological distress and unhealthy behaviors.[17,18] This screen time not only affects sleep but also promotes inactivity, leading to further physical and mental health issues, demonstrating the need for targeted interventions to promote healthier lifestyles among adolescents.[19,20]

Aims and Objectives

The present study aims to determine the association between dietary habits and lifestyle patterns of adolescents. The major objectives of the study include:

Department of Food Science and Nutrition Management, J.D. Birla Institute, Kolkata, West Bengal, India.

Corresponding Author: Uttiya Jana, Department of Food Science and Nutrition Management, J.D. Birla Institute, Kolkata, West Bengal, India. E-mail: uttiyaj@jdbikolkata.in

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- To determine the prevalence of overweight and obesity among adolescents
- To check the impact of dietary habits and lifestyle patterns on the gut health of adolescents
- To determine the difference in the dietary habits and lifestyle patterns of adolescents pre- and post-intervention.

Methodology

Phase I: Pre-Intervention Survey

A survey was carried out in Kolkata, West Bengal. The respondents were identified and selected from the schools and coaching centers located in the regions of North, South, Central, East and West Kolkata, West Bengal. 400 school-going adolescents were selected. A self-administered, semi-structured questionnaire was prepared and validated using Cronbach's Alpha coefficient method (0.786). A purposive random sampling technique was used to collect data from the respondents of the study. The questionnaire was divided into four different sections - (a) personal details, such as the socio-demographics, such as age, gender and family income of the respondents, (b) anthropometry analysis to understand the physical and structural growth of the respondents, (c) clinical analysis comprised of questions pertaining to hair, acne, fatigue and bowel movements to understand the clinical signs and symptoms which can be correlated to onset of diseases and disorders in the upcoming adulthood, if not corrected on time, and (d) lifestyle and dietary questions related to sleep, physical activity, screen time, social media influence along with the frequency of consumption of various food groups were added to understand the lifestyle pattern of the respondents. Descriptive statistics of anthropometric measurements, such as Mean and Standard Deviation were calculated for age, weight, height and body mass index (BMI) of the respondents. Statistical analysis was carried out using various methods, such as regression model, analysis of variance, Chi-square and paired-*t* test analysis.

Phase II: Intervention

Product development

Lavash crackers were developed as a healthy snacking option for adolescents instead of having junk fired foods. Originally, lavash is a flatbread common to the Mediterranean cuisine and is commonly eaten with hummus. Lavash crackers are just a crispy version of the traditional lavash bread. The traditional recipe was modified where refined flour was substituted with buckwheat flour in gradual variations along with the addition of functional ingredients, such as sesame seeds and flaxseed powder loaded with omega-3 fatty acids, proteins, vitamins, and minerals.

Nutrition education program

As part of the intervention, a Nutrition Education Program was conducted on 100 respondents out of the 400 respondents of the pre-intervention study. A subsample of 100 respondents was chosen through stratified random sampling from the regions of North, South, Central, East and West Kolkata, West Bengal. The focus of the program was to promote healthy dietary and lifestyle practices and to raise awareness about the developed Lavash crackers as a healthy snack choice along with the importance of proper nutrition during adolescence, such as value of a balanced diet consisting of both macro and micro nutrients which are critical for growth, energy, and cognitive development.

Phase III: Post-Intervention Survey

The survey was carried out among 100 subsamples from 400 respondents selected through a stratified sampling technique in the same areas of Kolkata, West Bengal, as a pre-intervention survey by using the same questionnaire.

Results And Discussion

Association between Dietary Habits and Lifestyle Pattern of the Respondents

H_0 There is no association between dietary habits and lifestyle pattern of the respondents

H_1 There is no association between dietary habits and lifestyle pattern of the respondents.

Table 1 exhibits the Chi-square analysis to check the association between the dietary habits and lifestyle pattern of respondents. Since $P < 0.05$, so H_0 is rejected and H_1 is accepted. Thus, there is a significant association between dietary habits and lifestyle pattern of adolescents.

Distribution of Body Mass Index among the Respondents

Figure 1 exhibits the range of BMI among the respondents. Among the participants, 51% had a normal BMI, while 29% were overweight, 14% underweight and 6% obese. Overweight

Table 1: Chi-square analysis of dietary habits and lifestyle patterns of respondents

	Test statistics	
Statistical analysis	*Dietary habits*	*Lifestyle pattern*
Chi-square	233.360[a]	147.300[a]
df	3	3
Asymptotic significant	<0.001	<0.001

[a]means Assumed mean in statistics

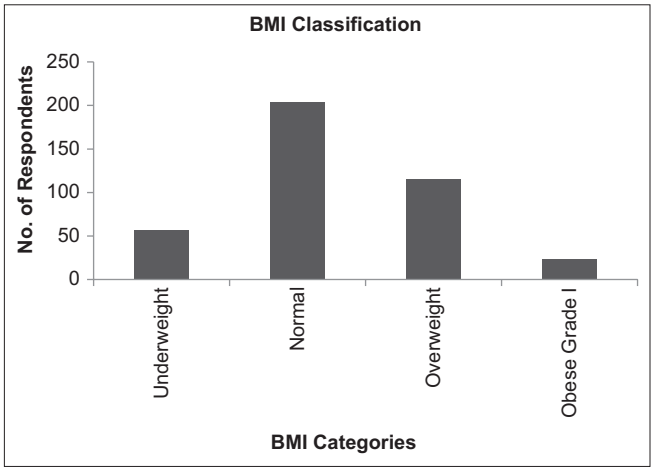

Figure 1: Range of body mass index among the respondents

and obesity can lead to several other lifestyle disorders, such as cardiovascular disease, diabetes and many more in the upcoming adulthood.

Level of Physical activity among the Respondents

Figure 2 shows the level of physical activity among the respondents. Physical activity varied, with 38% engaging in cycling, 34% playing cricket and 14% not involved in any physical activity.

Frequency of Packaged Food Consumption among the Respondents

Figure 3 represents the frequency of packaged food consumption among the respondents. Data shows that 39% of respondents consume packaged snacks and ready-to-eat foods 1–2 times in a week, 22% once in 15 days, 21% once in a month and 18% 3–4 times a week. Eating behaviors revealed that 49% overate occasionally, while 59% rarely skipped meals, and 39% binge-ate sometimes, with 50% engaging in emotional binge-eating.

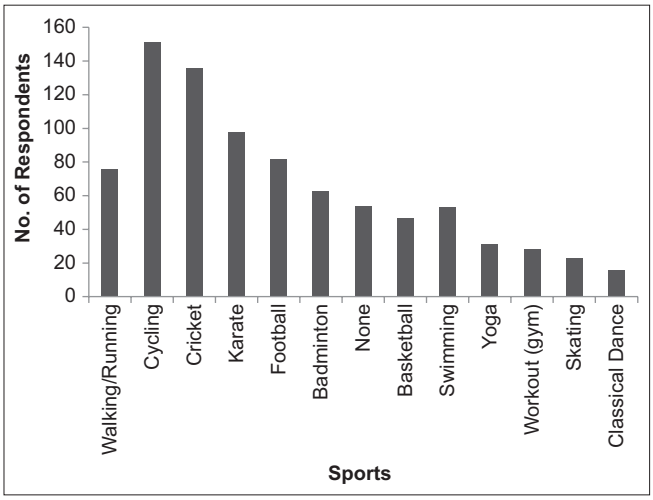

Figure 2: Level of physical activity

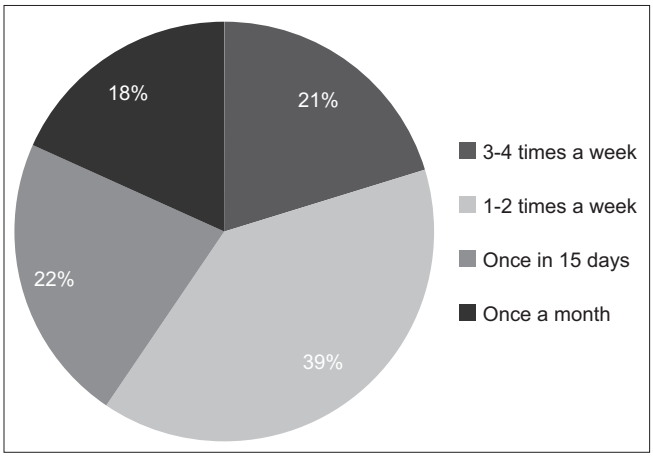

Figure 3: Frequency of packaged food consumption

Packaged snacks and ready-to-eat food consumption can lead to unhealthy eating pattern and have a great impact on the lifestyle diseases in the upcoming adult life.

Frequency of Fruits and Vegetable Consumption among the Respondents

Figure 4 represents the frequency of consumption of fruits and vegetables by the respondents. 54% of the respondents consume fruits and vegetables once a day, 29% consume once in 2–3 days, 12% consume once a week and 5% consume rarely. Rare consumption of fruits and vegetables indicates the deprivation of antioxidants, vitamin, minerals and the other bioactive components in the diet, which can also lead to lifestyle disorders in the later part of the life.

Gut Health Issues

Figure 5 represents different gut health issues experienced by the respondents. 23% of the respondents experience stomach ache, 19% experience heartburn, 17% experience constipation, 17% experience bloating and 4% suffer from diarrhea on a regular basis. Gut health issues are related to the dietary habit, such as less

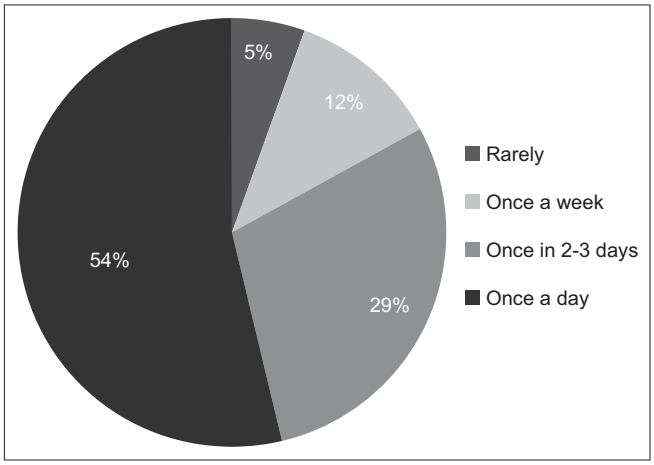

Figure 4: Frequency of fruits and vegetables consumption

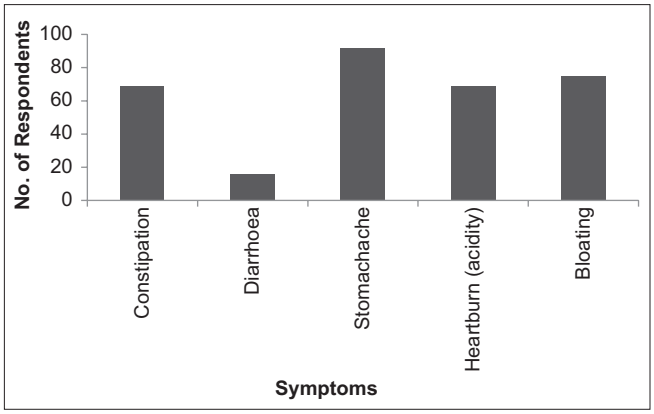

Figure 5: Gut health issues

consumption of fruits and vegetables and high consumption of package snacks and ready to eat foods on regular basis along with the less engagement in physical activity.

Difference in the Organoleptic Characteristics of Basic and Variation Recipe

Figure 6 depicts the difference in the organoleptic characteristics evaluated during sensory evaluation of the basic and the V4 (variation 4) recipe. It was observed that V4 has a higher preference of all the characteristics, such as appearance, color, taste, texture, odor and overall rating as compared to the basic recipe.

Difference in the Indian Council of Medical Research (ICMR) value of Basic and Variation Recipe

Figure 7 depicts the difference in the ICMR values of the basic and the V4 recipes. It can be observed that V4 has a higher amount of protein, fat, dietary fiber, iron, calcium and also provides more energy as compared to the basic recipe. These nutrients are essential to maintain the proper physiological function in the human body and also reducing the clinical manifestations, such as hut health issues, overweight and obesity.

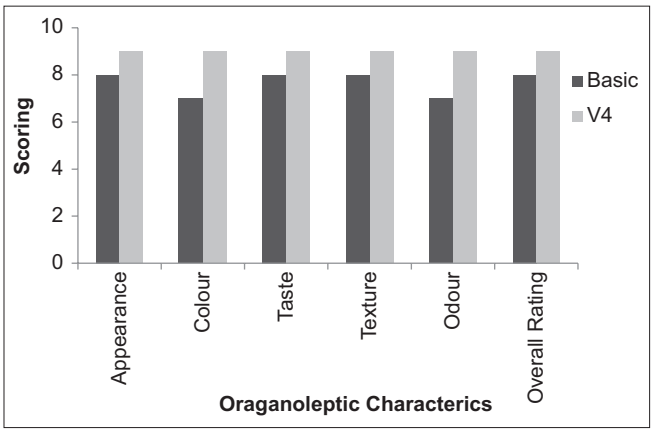

Figure 6: Difference in the organoleptic characteristics of basic and V4

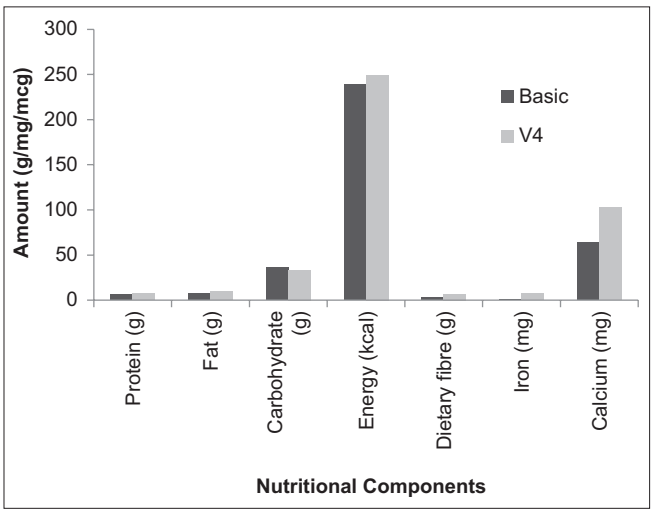

Figure 7: Difference in the Indian Council of Medical Research value of the basic and V4 recipe

Difference in the Dietary Habits of Adolescents Pre- and Post-Intervention

Table 2 exhibits the difference between the pre- and post-intervention survey. The results showing $P < 0.05$ which indicates that there is a significant difference between pre- and post-intervention responses. Average of post-intervention is more than that of pre-intervention while the variance of post-intervention is less than pre-intervention which means that the intervention had an impact on the dietary habits of adolescents.

Difference in the Lifestyle Pattern of Adolescents Pre- and Post-Intervention

Table 3 shows the difference in the lifestyle pattern of adolescents between the pre- and post-intervention survey. The results exhibit that the $P < 0.05$ which indicates that there is a significant difference between pre- and post-intervention responses. Average of post-intervention is more than that of pre-intervention while the variance of post-intervention is less than pre–intervention, which means that the intervention had an impact on the lifestyle pattern of adolescents.

Impact of Post-Intervention on the Clinical Symptoms of Adolescents

Figure 8 shows the impact of post-intervention son the clinical symptoms of adolescents. The result indicates the improvements in clinical symptoms. Gut health issues, such as constipation, bloating, and stomach ache have improved. There is also a reduction in fatigue, hair fall, and acne, alongside better sleep.

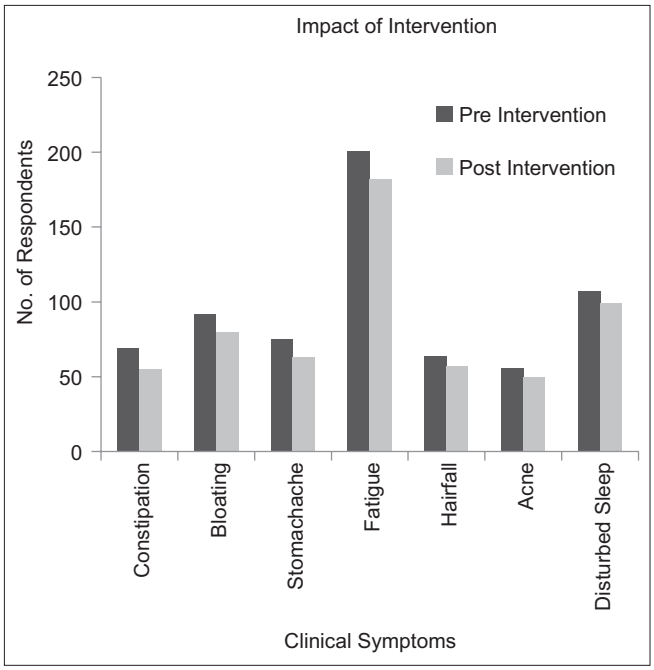

Figure 8: Post intervention changes in clinical symptoms

Table 2: ANOVA of dietary habits of adolescents between pre- and post-intervention

Summary					
Groups	*Count*		*Sum*	*Average*	*Variance*
Pre intervention	50		134	2.56	0.915918
Post intervention	50		128	2.68	0.782041
ANOVA					
Source of variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between groups	0.36	1	0.36	3.938111	0.048	0.424038
Within groups	83.2	98	0.84898			
Total	83.56	99				

ANOVA: Analysis of variance

Table 3: ANOVA of the lifestyle pattern of adolescents between pre- and post-intervention

Summary					
Groups	*Count*		*Sum*	*Average*	*Variance*
Pre intervention	50		126	2.38	0.826122
Post intervention	50		119	2.52	0.811837
ANOVA					
Source of variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between groups	0.49	1	0.49	3.938111	0.041	0.598306
Within groups	80.26	98	0.81898			
Total	80.75	99				

ANOVA: Analysis of variance

Conclusion

Dietary habits and lifestyle choices were found to significantly affect anthropometric measures, such as BMI. The pre-intervention study indicates that unhealthy dietary and lifestyle habits leading to adverse effects on body weight and clinical symptoms, highlighting the need for promoting healthy living among adolescents. Poor dietary choices and sedentary lifestyle patterns were strongly linked to gut health issues, such as diarrhea, constipation, bloating, and stomach aches, as well as fatigue.

Post-intervention analysis showed significant improvements in both dietary habits and lifestyle patterns, with reduced variance in responses. This indicates that educational and behavioral interventions can positively impact on the adolescent health. Post-intervention results showed a preference for the newly developed healthier snack option, which was richer in protein, dietary fiber, and essential micronutrients, such as calcium and iron, compared to the basic recipe.

Adolescence offers a critical window for developing new behavioral patterns related to food, physical activity, and other health-related habits. These behaviors can persist into adulthood, making this period crucial for health interventions. Thus, there is a need for targeted health education and intervention strategies, highlighting how lifestyle and dietary changes can significantly improve adolescent health outcomes.

Author Contribution

The survey was carried out among 400 respondents. All the data are genuine. The low-cost product Lavash has been made in the coking laboratory of J.D. Birla Institute, and the sensory evaluation was done by the semi trained panel.

Acknowledgments

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