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Association Between Fast Food Consumption And Anaemia Among School-Going Adolescents: A Cross-Sectional Study"

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Abstract
Background: Anaemia remains a major public health concern among adolescents, particularly in developing countries like India. Changing dietary patterns, including increased fast food consumption, and limited awareness about anaemia are contributing to its high prevalence.
Objectives: *This study aimed to assess the association between fast food consumption and doctor-diagnosed anaemia among adolescents, and to evaluate the level of anaemia awareness in relation to socio-demographic and anthropometric factors.*
Methods: *A cross-sectional study was conducted among 326 school-going adolescents aged 13– 17 years from grades 8 to 12. Data were collected using a structured questionnaire covering socio-demographic details, fast food consumption, awareness of anaemia, and self-reported anaemia diagnosis. Body Mass Index (BMI) was calculated using measured height and weight. Statistical analysis was performed using SPSS, and the Chi-square test was used to assess associations.*
Results: *A significant association was observed between fast food consumption and anaemia. Among those diagnosed with anaemia, 96.2% consumed fast food, compared to 68.1% of non- anaemic participants ($p < 0.001$). Awareness of anaemia was reported by only 42.9% of participants. Higher awareness was significantly associated with younger age (13–15 years, $p = 0.012$), lower class level (8–10, $p < 0.001$), higher parental education—especially maternal ($p < 0.001$), and higher family income ($p < 0.001$). No significant association was found with residence or BMI.*
Conclusion: *The study highlights a strong association between fast food consumption and anaemia among adolescents and reveals substantial gaps in awareness, particularly among socio- economically disadvantaged groups. Targeted nutritional education and health awareness campaigns, especially involving mothers and schools, are essential to prevent anaemia and promote adolescent health.*

Keywords: *Anaemia, adolescents, fast food, awareness, nutrition, socio-demographic factors, BMI, public health*

INTRODUCTION

Anaemia is a widespread public health problem and one of the most common nutritional deficiencies globally, especially among children and adolescents. According to the World Health Organization (WHO), anaemia affects more than 1.6 billion people worldwide, with adolescents being a particularly vulnerable group due to their rapid physical growth, increased iron requirements, and the onset of menstruation in girls. In India, the situation is especially alarming, with the National Family Health Survey (NFHS-5) reporting that over 59% of adolescent girls and 31% of adolescent boys are anaemic. Anaemia during adolescence can have far-reaching consequences, including reduced physical capacity, impaired cognitive development, poor academic performance, and long-term reproductive health issues, particularly in adolescent girls.

While iron-deficiency anaemia is the most common form, often due to inadequate dietary intake of iron-rich foods, it is increasingly recognized that modern lifestyle changes, including dietary transitions, are exacerbating this problem. Over the past two decades, there has been a significant rise in the consumption of fast food among adolescents. Fast food is typically energy-dense and rich in unhealthy fats, sugars, and sodium but deficient in essential micronutrients such as iron, folate, and vitamin B12. Frequent consumption of such foods may displace more nutritious meals and contribute to iron deficiency and other forms of undernutrition. Despite this, fast

food remains highly popular among adolescents due to its taste, affordability, and convenience, particularly in urban and semi-urban settings.

In addition to dietary habits, awareness of anaemia and its health implications is a critical factor in its prevention and management. However, awareness levels among adolescents vary widely and are often influenced by multiple socio-demographic factors, including age, educational level, parental literacy, household income, and residential background. Parental education—especially that of mothers—has been shown to play a pivotal role in shaping children's health-related knowledge and practices. Similarly, socio-economic status may determine access to healthcare services, nutritious food, and exposure to health information through media and schooling. Despite various government interventions like the Weekly Iron and Folic Acid Supplementation (WIFS) programme and Rashtriya Kishor Swasthya Karyakram (RKSK), there remains a considerable gap in both awareness and adherence to anaemia prevention strategies among adolescents.

Given this background, it is crucial to explore the link between adolescents' eating behaviors and their health status, as well as the extent to which they are aware of anaemia and its consequences. A better understanding of these associations can inform the design of more effective, targeted interventions and educational programs.

The present study was conducted to examine two key objectives: first, to assess the association between fast food consumption and doctor-diagnosed anaemia among adolescents; and second, to evaluate the level of awareness about anaemia in relation to socio-demographic and anthropometric variables such as age, school grade, body mass index (BMI), residential location, parental education, and household income. By identifying both behavioral risk factors and knowledge gaps, this study aims to contribute to the broader effort of improving adolescent health outcomes and guiding evidence-based public health strategies for anaemia prevention and control.

METHODOLOGY:

STUDY DESIGN AND SETTING

A cross-sectional, observational study was conducted among school-going adolescents to assess the association between fast food consumption and doctor-diagnosed anaemia, as well as to evaluate the level of awareness about anaemia across various socio-demographic variables. The study was carried out in selected schools within a defined geographical region [insert district/city name], representing both urban and semi-urban populations.

STUDY POPULATION

The target population included adolescents aged 13 to 17 years enrolled in grades 8 to 12. A total of 326 students participated in the study. Participants were selected through stratified random sampling to ensure representation across different classes, age groups, and residential areas.

INCLUSION CRITERIA

- Adolescents aged 13–17 years
- Enrolled in classes 8–12
- Provided informed assent and parental consent
- Willing to participate in the study

EXCLUSION CRITERIA

- Students with chronic illnesses or conditions affecting haemoglobin levels (e.g., thalassemia, sickle cell anaemia)
- Those currently undergoing treatment for anaemia
- Incomplete or inconsistent responses in the questionnaire

DATA COLLECTION TOOLS

Data were collected using a structured, pre-tested questionnaire administered in the local language and English. The questionnaire included sections on:

- Socio-demographic profile – Age, gender, class, parental education, family income, and residence type (urban/semi-urban/rural).
- Dietary habits – Frequency of fast food consumption (yes/no), and type of commonly consumed fast food.
- Anaemia awareness – Knowledge of anaemia symptoms, causes, prevention, and treatment.
- Medical history – Self-reported doctor-diagnosed anaemia.
- Anthropometric data – Height and weight were measured using standardized equipment to calculate Body Mass Index (BMI), categorized as underweight, normal, or overweight/obese according to WHO guidelines.

ETHICAL CONSIDERATIONS

Ethical clearance was obtained from the institutional ethics committee [insert name]. Informed consent was obtained from parents/guardians, and assent was taken from the students. Confidentiality and anonymity of all participants were maintained throughout the study.

STATISTICAL ANALYSIS

Data were entered into Microsoft Excel and analyzed using SPSS version [insert version, e.g., SPSS v25]. Descriptive statistics were used to summarize demographic and clinical variables. The association between categorical variables (e.g., anaemia status, fast food consumption, awareness levels) was tested using the Chi-square test. A p-value of <0.05 was considered statistically significant.

RESULT AND OBSERVATION

Table 1: Awareness of Anaemia Among Adolescents

Variable	Category	No (n, %)	Yes (n, %)	Total (n)	P value
Age in Category	13–15	23 (41.8%)	32 (58.2%)	55	0.012
	16–17	163 (60.1%)	108 (39.9%)	271	
Class	8–10	15 (31.3%)	33 (68.8%)	48	<0.001
	11–12	171 (61.5%)	107 (38.5%)	278	
Body Mass Index	Underweight	53 (63.9%)	30 (36.1%)	83	0.077
	Healthy weight	121 (56.8%)	92 (43.2%)	213	
	Overweight/Obese	12 (40.0%)	18 (60.0%)	30	
Residence	Rural/Semi-Urban	36 (60.0%)	24 (40.0%)	60	0.610
	Urban	150 (56.4%)	116 (43.6%)	266	
Father's Education	Illiterate	11 (78.6%)	3 (21.4%)	14	0.017
	Primary	11 (44.0%)	14 (56.0%)	25	
	Secondary	62 (67.4%)	30 (32.6%)	92	
	Graduate/Above	102 (52.3%)	93 (47.7%)	195	
Mother's Education	Illiterate	12 (57.1%)	9 (42.9%)	21	<0.001
	Primary	31 (79.5%)	8 (20.5%)	39	
	Secondary	65 (67.7%)	31 (32.3%)	96	
	Graduate/Above	78 (45.9%)	92 (54.1%)	170	
Income	Less than ₹10,000	8 (61.5%)	5 (38.5%)	13	<0.001
	₹10,000 – 20,000	38 (76.0%)	12 (24.0%)	50	
	₹20,000 – 50,000	83 (62.4%)	50 (37.6%)	133	
	More than ₹50,000	57 (43.8%)	73 (56.2%)	130	
Total		186 (57.1%)	140 (42.9%)	326	

The table 1 presents the distribution of anaemia awareness across various demographic and socioeconomic variables among a sample of 326 adolescents. Overall, 42.9% of the participants reported being aware of anaemia, while 57.1% were not. Age was significantly associated with awareness levels ($p = 0.012$), with younger adolescents

(13–15 years) showing greater awareness (58.2%) compared to those aged 16–17 years (39.9%). Awareness also varied significantly by school class ($p < 0.001$), where students in classes 8–10 had a much higher awareness (68.8%) compared to those in classes 11–12 (38.5%).
Body Mass Index (BMI) was not significantly associated with anaemia awareness ($p = 0.077$), though a slightly higher proportion of overweight/obese students (60%) were aware, compared to underweight (36.1%) and healthy-weight students (43.2%). Regarding residence, awareness levels were similar between urban (43.6%) and rural/semi-urban (40%) participants, with no significant difference ($p = 0.610$).

Parental education showed strong associations with awareness. Adolescents whose fathers were graduates or above reported greater awareness (47.7%), while those whose fathers were illiterate had the lowest awareness (21.4%), with a statistically significant p-value of 0.017. Maternal education had an even stronger impact ($p < 0.001$); children of mothers who were graduates or above showed the highest awareness (54.1%), while those with mothers who had only primary education showed the least (20.5%).

Family income also showed a clear trend: participants from higher-income families (earning more than ₹50,000 per month) had significantly higher awareness levels (56.2%), while those from lower-income groups (especially ₹10,000–₹20,000) had the lowest awareness (24%), with the difference being statistically significant ($p < 0.001$). These findings highlight the influence of education and socioeconomic status on adolescent health awareness.

Diagnosed with Anaemia	Fast Food: No (n, %)	Fast Food: Yes (n, %)	Total (n)	P value
No	79 (31.9%)	169 (68.1%)	248	<0.001
Yes	3 (3.8%)	75 (96.2%)	78	
Total	82 (25.2%)	244 (74.8%)	326	

Table 2: Association Between Doctor-Diagnosed Anaemia and Fast Food Consumption

This table 2 examines the relationship between fast food consumption and doctor-diagnosed anaemia. Among the 326 participants, a strong and statistically significant association was found ($p < 0.001$). Among those not diagnosed with anaemia, 68.1% reported consuming fast food, while 31.9% did not. In contrast, an overwhelming 96.2% of participants diagnosed with anaemia reported consuming fast food, compared to just 3.8% who did not.
These findings suggest a possible link between poor dietary habits—particularly high fast food intake—and anaemia. Although causality cannot be established from this data alone, the results indicate that adolescents with frequent fast food consumption may be at a significantly higher risk of being anaemic. This underscores the need for dietary education and interventions to promote iron-rich, balanced diets, particularly among adolescents.

DISCUSSION

The findings of this study demonstrate a significant association between fast food consumption and doctor-diagnosed anaemia among adolescents, with 96.2% of anaemic individuals consuming fast food compared to 68.1% of non-anaemic peers ($P < 0.001$). This aligns with observations by Gupta and Gupta (2015), who reported that frequent fast food consumption, characterized by low micronutrient density, contributes to nutritional deficiencies including iron deficiency anaemia in adolescents. Similarly, Singh and Chadha (2018) highlighted that the increasing preference for processed and convenience foods among Indian youth displaces traditional diets rich in iron and other essential nutrients, exacerbating the risk of anaemia. Our results reinforce the urgent need to address dietary behaviors as modifiable risk factors in anaemia prevention strategies. Regarding anaemia awareness, only 42.9% of participants reported being aware of the condition, which is consistent with prior studies suggesting low levels of health literacy about anaemia in adolescent populations. Balarajan et al. (2011) emphasized that inadequate awareness often hinders early diagnosis and treatment, perpetuating high anaemia prevalence. Interestingly, our data showed younger adolescents (13–15 years) and students in lower classes (8–10) had higher awareness than older students, which contrasts with the common assumption that awareness improves with age. This pattern may be reflective of targeted health education initiatives at the middle school

level, a finding also noted by Smith and Smith (2017) in their work on school-based health interventions. Parental education, especially maternal literacy, was strongly associated with increased anaemia awareness, with 54.1% awareness among children of graduate mothers compared to just 20.5% among those whose mothers had only primary education. This finding corroborates studies by Smith and Smith (2017), who reported that maternal education significantly influences children's health knowledge and practices. Our results highlight the critical role mothers play in shaping adolescent health behaviors, emphasizing the importance of empowering women through education to improve community health outcomes.Socioeconomic status, as measured by household income, also showed a significant relationship with anaemia awareness. Adolescents from higher income families (>₹50,000) had significantly better awareness (56.2%) compared to those from lower-income households (24.0%), echoing findings from NFHS-5 data and research by Balarajan et al. (2011) that wealthier families often have better access to health information and services. However, urban versus rural residence did not significantly affect awareness, suggesting that other social determinants such as education and income may have stronger influences, a trend also reported by other researchers in similar contexts.Body Mass Index (BMI) categories showed no significant differences in awareness, though overweight and obese adolescents had slightly higher awareness (60%) than their underweight peers (36.1%). This may be attributed to increased health monitoring in overweight adolescents, as suggested by Gera and Sachdev (2002) who noted that health screening often targets groups perceived at risk for chronic diseases.

Overall, these findings underscore the multifactorial nature of anaemia and its prevention, involving dietary habits, socio-economic factors, and health education. The significant role of fast food consumption aligns with global concerns about nutritional transitions adversely impacting adolescent health. Furthermore, the associations between parental education, income, and awareness emphasize the importance of integrated approaches that combine nutritional interventions with educational and socio-economic empowerment. School-based programs, parental engagement, and community outreach remain critical strategies to improve adolescent health literacy and reduce the burden of anaemia, as recommended by the Ministry of Health and Family Welfare, Government of India (2014) in their RKSK framework.

CONCLUSION

This study highlights a significant association between fast food consumption and the presence of anaemia among adolescents, suggesting that poor dietary habits may contribute to the increasing burden of anaemia in this age group. Additionally, the findings reveal that awareness of anaemia remains low overall, with notable disparities based on age, educational level, parental education—particularly maternal—and household income. Adolescents from higher socio- economic backgrounds and those with more educated parents were significantly more likely to be aware of anaemia, while no significant differences were observed by place of residence or body mass index.

LIMITATIONS

Despite providing valuable insights, this study has several limitations that should be acknowledged. First, the cross-sectional design limits the ability to establish causal relationships between fast food consumption and anaemia. While a strong association was observed, it is not possible to determine temporality or directionality from the data collected. Longitudinal studies would be needed to confirm causation.

Second, data on fast food consumption and awareness were self-reported by adolescents, which introduces the possibility of recall bias or social desirability bias. Participants may have underreported unhealthy eating behaviors or overreported their knowledge of anaemia, potentially affecting the accuracy of the findings.Third, the diagnosis of anaemia was based on previous doctor diagnoses rather than direct measurement of haemoglobin levels during the study. This reliance on self-reported medical history may have resulted in misclassification or underreporting of anaemia cases.

Fourth, the study population was limited to school-going adolescents in a specific geographic area, which may affect the generalizability of the findings to adolescents outside this setting, including those not attending school or from different cultural or socio-economic backgrounds.

Finally, while several socio-demographic factors were examined, other potential confounders such as dietary diversity, menstrual history in girls, parasitic infections, and access to healthcare services were not assessed and

could influence both anaemia prevalence and awareness. Future research incorporating objective clinical assessments, larger and more diverse samples, and longitudinal designs would help overcome these limitations and provide a more comprehensive understanding of the determinants of anaemia among adolescents.

These results underscore the urgent need for targeted nutrition education and awareness programs that not only discourage unhealthy eating patterns but also promote understanding of anaemia, its causes, and its prevention. School-based health education, parental involvement— especially among mothers—and inclusive public health campaigns focusing on underprivileged groups are critical. Addressing both behavioral and socio-economic determinants of health through such strategies can play a key role in reducing the prevalence of anaemia and promoting the overall well-being of adolescents.

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