Adverse eating behavior and its association with obesity in Indian adolescents: Evidence from a nonmetropolitan city in India

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ABSTRACT

Introduction: With the so-called modernization, the epidemiological and sociocultural context of adolescents in developing countries is rapidly changing and is affecting their eating behavior and dietary choices. The objective of our study is twofold. First, our study seeks to find whether there is a prevalence of the adverse eating behaviors among the adolescents. Second, our study seeks to examine whether the prevalence of the adverse eating behavior is related to obesity and quantifies their association of with body mass index (BMI) status. **Materials and Methods:** A cross-sectional school-based study was conducted in 13–15-year-old adolescents from schools of Aligarh, India, with prevalidated study tools and standardized anthropometric measures. The Z-scores were found by the WHO recommended AnthroPlus. **Results:** The results indicate a high prevalence of different adverse eating behaviors. The dietary behavior was found to be poor in 19.3%, fair in 54.4%, and good in only 26.3% of the study population. The mean BMI for age Z-score was found to be 0.87 and 0.02 in poor and fair dietary behavior. The odds of being overweight and obese were high (1.82 [1.20–2.78]) in those with poor dietary behavior. **Conclusions:** Our findings suggest that more research and timely intervention in adverse eating behaviors are much needed in India before this widely neglected problem acquires even more alarming and gigantic proportions.

Keywords: Adolescents, dietary behavior, nutrition, transition

Introduction

There is no denying the fact that the world today is witnessing massive economic, social, and cultural transition at a brisk rate. However, since our minds are preoccupied with the singular pursuit of economic growth, it is often overlooked that India – the home to approximately one-fifth of the world's population – is undergoing significant nutritional and epidemiological transition too. Given the direct and indirect socioeconomic consequences and public health affliction that

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such nutritional and epidemiological changes may bring to approximately 20% of the world's people, this area deserves greater scientific attention.

One such change that is quite visible yet relatively under-researched is the changing dietary behavior in younger sections of Indian population. Dietary behavior is undergoing notable adjustments at a transformational scale and is directly linked to the "New World Syndrome," where developing countries are changing their habits and lifestyle to a junk food-based sedentary lifestyle, quite often in the blind imitation of the west, and the aggressive marketing by fast-food companies. Obesity has been identified among the first wave of this New World Syndrome,[1]

followed by many associated chronic diseases (cardiovascular disease and diabetes in particular), which are creating an onerous socioeconomic and public health burden in developing countries. These have now assumed the scales of a global pandemic and should be regarded as today's principal neglected public health problem.[2]

The prevailing popularity of adverse dietary behavior has been linked to the import of western lifestyle in the people of the developing world. Some of the leading instances of adverse dietary practices include an irregularity in having timely breakfast, a low frequency of fruit and vegetable intake, a predisposition toward higher consumption of junk food, and a high frequency of soft drink intake. Regular breakfast leads to beneficial alterations in the appetitive, hormonal, and neural signals that control food intake regulation, and breakfast skipping leads to obesity.[3,4] On the other hand, fruits and vegetables are rich in water and fiber and low in energy density. Therefore, they protect from adiposity due to the satiating effect of fiber resulting in fewer calories consumed[5,6] and the displacement of energy-dense foods.[7,8] On the contrary, the junk food and soft drinks are energy dense and sources of empty calories, which lead to obesity. Thus, the changing dietary patterns, which simultaneously include a higher consumption of the more energy-dense food and a lower consumption of the less energy-dense food, could be causing double harm.

Given the nature of a very attractive market size – India as a market not only offers a large working population but also a young vulnerable population – and the more pronounced effects of advertisement and marketing on younger people's consumption behavior, the manufacturers and suppliers indulge in an aggressive marketing of junk food and soft drinks in the pursuit of financial returns. The bundling of such products further increases the financial returns of the firms on the supply side as these firms reap benefits of the economies of scale as well as the economies of scope. Could such combination or bundling of the more energy-dense food products be causing more harm to the society, although it increases the financial returns of the supply-side firms? Extant research has interpreted this increased market penetration of soft drinks, with or without fast food, in the developing countries as coca-colonization and cultural hybridization of these countries.[9] Adolescents, in particular, are greatly influenced in their eating habits by peer pressure, mass media campaigns, changing social and cultural norms and fashion, and the lack of nutrition knowledge.[10,11] Thus, they form a sizeable and vulnerable constituent on the demand side.

Our study focuses on this important market constituent, the adolescents, in an Indian tier-2 city that represents a society at the center of transition – not just economic and cultural but also nutritional and epidemiological. The objective of our study is twofold. First, our study seeks to find whether there is a prevalence of the adverse eating behaviors among the adolescents. Second, our study seeks to examine whether the prevalence of the adverse eating behavior is related to obesity

and quantifies their association of with body mass index (BMI) status. According to our knowledge, this is the first study with a substantive sample size, focusing on the prevalence of a specific dietary behavior – in the context of a developing country's tier-2 city – and its relation to the recently recommended WHO Multicentric Growth Reference Standards (MGRS, 2007).[12]

Materials and Methods

Study design and settings
This research employs a cross-sectional study conducting a one-time assessment of nutritional status through survey questions on dietary behavior based on the modified Global student-based school health survey (GSHS)-expanded questionnaire. The cross-sectional study was conducted over a period of 6 months, from November 2011 to April 2012, in three schools affiliated to the Aligarh Muslim University Board of Examination. These are among the largest schools in the district of Aligarh. Prior permission was obtained from the school authorities and consent was taken from parents for the cross-sectional study. The study included all the students between 13 and 15 years, according to the methodology of WHO GSHS and Global Youth Tobacco Survey.[13,14] The inclusion criterion used was all students enrolled in the aforementioned schools and who were present and gave their assent for the study.

Study tools
The pro forma survey comprised a prevalidated and pretested set of diet-related questions in the WHO GSHS questionnaire format, customized for better response and scoring. The survey questionnaire sought answers to the dietary behavior: frequency of vegetable intake per day, fruit intake per day, soft drink intake per day, junk food intake per week, and breakfast intake per week. There were two specific questions for each of these categories of food: Q1 = How many times does the respondent consume it in a usual week? Q2 = How many times did the respondent consume it last week? Based on the answers to the aforementioned questions, the intake frequency was calculated as Q1 + Q2 divided by 2 for each variable. Table 1 shows the scoring for each variable. Based on the cumulative score, a dietary behavior score was calculated; it was categorized into "poor" for a score from 0 to 4, "fair" for a score from 5 to 9, and "good" for a score from 10 to 13.

The nutritional status and anthropometric records were measured by the recently recommended WHO MGRS 2007.[12] Anthropometric measurements of weight and standing height were recorded using standard techniques prescribed by the WHO.[15] Weight was measured with minimal possible clothing in the upright position to the nearest 0.1 kg using calibrated instruments, and standing height was measured without shoes to the nearest 0.1 cm. BMI for age Z-scores was used to define overweight and obese. Other precautions carried out during the study included regular calibration of instruments and recording date of birth from written records – the School Register. Any adolescent having body mass for age Z-score more than + 1

Table 1: Scoring of different dietary behaviors*					
Frequency of vegetable intake	Frequency of fruit intake	Frequency of soft drink intake	Frequency of junk food intake	Frequency of breakfast consumption	Score
Not everyday	Not everyday	≥2 times daily	≥4 times/week	≤1/week	0
Once daily	Once daily	Once daily	2-3 times/week	2-3 times/week	1
≥2 times daily	≥2 times daily	Not everyday	Once/week	4-5 times/week	2
Not applicable	Not applicable	Don't drink	Don't eat	6-7 times/week	3

*The scoring was devised by the authors to find a cumulative scoring system for the different adverse eating behaviors used in this survey

standard deviation (SD) in the WHO reference (equivalent to 85th percentile) was classified as overweight, and the one more than + 2 SD in the WHO reference (equivalent to 97th percentile) was classified as obese, as per WHO reference standards 2007.[12,16]

Data management and statistics

The study used the WHO recommended software application called WHO AnthroPlus. The weight and height measurement data were entered in WHO AnthroPlus on the day of visit. AnthroPlus was used to find the Z-scores based on the WHO MGRS 2007, specific to the age and gender. Those students whose BMI for age Z-score values (Z-score ± >5) were flagged by WHO AnthroPlus during the data entry or who were found to have extreme values were revisited within 2 days, and anthropometry was repeated. Later, these data were transferred to Statistical Product and Service Solutions (IBM SPSS Statistics) version 20.0 (IBM Corp., Armonk, NY, USA), which was used to examine the prevalence of adverse dietary behaviors and the association between frequency of different eating behaviors and overweight or obesity. The associations were tested by Chi-square test and analysis of variance (ANOVA) for categorical and continuous variables, respectively.

Ethics

The multidisciplinary Institutional Ethics and Research Advisory Committee approved the study. Subsequent to the completion of the study, appropriate counseling sessions were conducted to impact health education, including but not limited to advices on healthy eating practices, information on the hazards of adverse dietary behavior, their ill effects on long-term health, and avoidable economic burden. Those who were identified to be in need of referral were referred to the Jawaharlal Nehru Medical College and Hospital, Aligarh.

Results

Prevalence of adverse eating behavior

A total of 1416 students were studied, including 712 males and 704 females. The frequency of vegetable intake was found to be once daily in 40.0% (567/1416) of the studied population and ≥2 times daily in 27.5% (390/1416). Almost 32.4% (459/1416) of the studied population did not eat vegetables every day. The frequency of fruit intake showed slightly worse results. About 41.7% (590/1416) of the students did not eat fruits every day, 36.8% (521/1416) ate fruits once daily, and only 21.5% (305/1416) ate fruits twice or more times daily. The frequency of soft drink

intake was found to be as high as twice or more times daily in 11.4% (162/1416), once daily in 23.2% (328/1416), and only 39.1% (554/1416) did not consume soft drinks every day. The frequency of junk food intake was found to be four or more times per week in 15.0% (212/1416), two to three times per week in 26.5% (375/1416), once per week in 33.4% (473/1416), and only 25.1% (356/1416) of the studied population did not consume junk food every week. Breakfast consumption was found to be almost regular, 6 or 7 times/week in 66.2% (938/1416), 4–5 times/week in 14.4% (204/1416), 2–3 times/week in 13.1% (186/1416), and once or less per week in 6.2% (88/1416) of the studied population.

In aggregate, the dietary behavior score was found to be poor in 19.3% (273/1416), fair in 54.4% (771/1416), and good in 26.3% (372/1416) of the population under study. Table 2 shows the detailed prevalence of different eating behaviors. No significant difference was observed between the eating behaviors of males and females.

Association of adverse eating behavior with nutritional status (overweight/obesity)

Table 3 shows the association between eating behaviors and the prevalence of overweight or obesity. The prevalence of overweight or obesity was significantly higher at 29.2% in those who did not consume vegetables daily, compared to only 7.8% in those who consumed vegetables once daily. Similarly, the prevalence of overweight or obesity was significantly higher at 23.8% in those who did not consume fruits daily, compared to only 14.1% in those who consumed fruits twice or more times daily. Those with a higher frequency of soft drink intake showed a significantly higher prevalence of overweight or obesity too: 22.8% in those who consumed soft drinks twice or more times daily, compared to 12.4% in those who did not consume soft drinks every day and only 9.7% in those who did not consume soft drinks. A significantly higher prevalence of overweight or obesity was also found in those with higher frequency of junk food intake: 19.3% in those who consumed junk food greater than or equal to four times a week, compared to only 8.7% in those who did not consume junk food.

A significant association was also observed with the frequency of breakfast consumption: those who had breakfast irregularly showed a higher prevalence of overweight or obesity. A prevalence of 29.5% overweight or obesity was found in those who had breakfast once or less a week, as opposed to 10.9% in those who had breakfast on 6 or 7 days a week.

Table 2: Prevalence of adverse eating behaviors					
Eating behavior	Frequency	Male (n=712), n (%)	Female (n=704), n (%)	Total (n=1416) (n)	Statistical test results (χ^2, df, P)
Frequency of vegetable intake	Not everyday	219 (30.8)	240 (34.1)	459	4.76, 2, 0.09
	Once daily	279 (39.2)	288 (40.9)	567	
	≥2 times daily	214 (30.0)	176 (25.0)	390	
Frequency of fruit intake	Not everyday	293 (41.2)	297 (42.2)	590	0.16, 2, 0.92
	Once daily	264 (37.1)	257 (36.5)	521	
	≥2 times daily	155 (21.8)	150 (21.3)	305	
Frequency of soft drink intake	≥2 times daily	80 (11.2)	82 (11.6)	162	1.82, 3, 0.61
	Once daily	173 (24.3)	155 (22.0)	328	
	Not everyday	268 (37.6)	286 (40.6)	554	
	Don't drink	191 (26.8)	181 (25.7)	372	
Frequency of junk food intake	≥4 times/week	102 (14.3)	110 (15.6)	212	3.06, 3, 0.38
	2-3 times/week	197 (27.7)	178 (25.3)	375	
	Once/week	226 (31.7)	247 (35.1)	473	
	Don't eat	187 (26.3)	169 (24.0)	356	
Frequency of breakfast consumption	≤1/week	46 (6.5)	42 (6.0)	88	5.67, 3, 0.13
	2-3 times/week	107 (15.0)	79 (11.2)	186	
	4-5 times/week	94 (13.2)	110 (15.6)	204	
	6-7 times/week	465 (65.3)	473 (67.2)	938	
Dietary behavior*	Poor	140 (19.7)	133 (18.9)	273	1.38, 2, 0.50
	Fair	377 (52.9)	394 (56.0)	771	
	Good	195 (27.4)	177 (25.1)	372	

Table 3: Eating behaviors and nutritional status					
Eating behavior	Frequency	Nutritional status		Total (n)	Statistical test results (χ^2, df, P)
		Overweight/obese (n=207), n (%)	Normal (n=1209), n (%)		
Frequency of vegetable intake	Not everyday	134 (29.2)	325 (70.8)	459	115.6, 2, <0.01
	Once daily	44 (7.8)	523 (92.2)	567	
	≥2 times daily	29 (7.4)	361 (92.6)	390	
Frequency of fruit intake	Not everyday	141 (23.8)	449 (76.1)	590	38.3, 2, <0.01
	Once daily	98 (18.8)	423 (81.2)	521	
	≥2 times daily	43 (14.1)	262 (85.9)	305	
Frequency of soft drink intake	≥2 times daily	37 (22.8)	125 (77.2)	162	25.2, 3, <0.01
	Once daily	65 (19.8)	263 (80.2)	328	
	Not everyday	69 (12.4)	485 (87.5)	554	
	Don't drink	36 (9.7)	336 (90.3)	372	
Frequency of junk food intake	≥4 times/week	41 (19.3)	171 (80.7)	212	14.9, 3, <0.01
	2-3 times/week	60 (16.0)	315 (84.0)	375	
	Once/week	75 (15.8)	398 (84.1)	473	
	Don't eat	31 (8.7)	325 (91.3)	356	
Frequency of breakfast consumption	≤1/week	26 (29.5)	62 (70.4)	88	46.7, 3, <0.01
	2-3 times/week	49 (26.3)	137 (73.6)	186	
	4-5 times/week	30 (14.7)	174 (85.3)	204	
	6-7 times/week	102 (10.9)	836 (89.1)	938	
Dietary behavior*	Poor	57 (20.9)	216 (79.1)	273	10.7, 2, <0.01
	Fair	103 (13.4)	668 (86.6)	771	
	Good	47 (12.6)	325 (87.4)	372	

In aggregate, the dietary behavior showed a significant association with overweight or obesity. Those with a poor dietary behavior showed a higher prevalence of overweight or obesity at 20.9%, compared to those with a fair dietary behavior with a prevalence of overweight or obesity at only 13.4% and to those with a good dietary behavior with a prevalence of overweight or obesity even lower at 12.6%.

Further analysis revealed that the odds of being overweight or obese were more than fivefold high at 5.13 (3.34–7.88) in those who did not consume vegetables every day, compared to the odds of 1.05 (0.64–1.70) in those who consumed vegetables once a day. The odds of being overweight or obese were also found to be higher in those with higher frequency of soft drink intake. The odds were found to be more than twice high at 2.75 (1.67–4.54)

in those with soft drink intake frequency of twice or greater, compared to the odds of 1.32 (0.86–2.02) in those who did not consume soft drinks every day. Similarly, the odds of being overweight or obese also increased with a higher frequency of junk food intake. The odds of being overweight or obese were higher at 2.51 (1.52–4.15) in those with a frequency of junk food intake at four times or greater a week, compared to the odds of 1.98 (1.27–3.08) in those who consumed junk food once a week. A poor dietary behavior showed significantly higher odds of being overweight or obese at 1.82 (1.20–2.78), compared to a

fair dietary behavior that showed these odds at 1.07 (0.737–1.54). Table 4 shows the results of the ANOVA testing.

Association of adverse eating behavior with body mass index *Z*-scores

While the vegetable intake frequencies showed an insignificant effect on mean BMI *Z*-scores [F(2, 1413) = 2.73, *P* = 0.06], the fruit intake showed a significant effect on mean BMI *Z*-scores [F(2, 1413) = 575.30, *P* < 0.001]. The soft drink intake frequencies also had a significant effect on mean BMI

Table 4: Relationship of eating behaviors with body mass index for age *z*-scores				
Eating behavior	Frequency	Mean BMIZ (BMI for age- Z score)		Standard deviation (SD)	*n*
		Mean	95% CI		
Frequency of vegetable intake	Not everyday	0.01	−0.08-0.09	0.94	459
	Once daily	−0.05	−0.11-0.02	0.82	567
	≥2 times daily	−0.13	−0.22-0.04	0.91	390
	Total	−0.05	−0.10-−0.01	0.89	1416
	[*F*(2, 1413)=2.73, *P*=0.06]. *Post hoc* Tukey's honest significant testing reveals no significant difference between any of the subgroups (*P*>0.05)				
Frequency of fruit intake	Not everyday	−0.70	−0.76-−0.64	0.79	590
	Once daily	0.17	0.13-0.22	0.55	521
	≥2 times daily	0.81	0.75-0.88	0.56	305
	Total	−0.05	−0.10-−0.01	0.89	1416
	[*F*(2, 1413)=575.30, *P*<0.001] *Post hoc* Tukey's honest significant testing reveals a significant difference between all the subgroups (*P*<0.001)				
Frequency of soft drink intake	≥2 times daily	0.95	0.86-1.04	0.56	162
	Once daily	0.50	0.44-0.57	0.58	328
	Not everyday	−0.10	−0.16-−0.05	0.61	554
	Don't drink	−0.90	−0.98-−0.82	0.75	372
	Total	−0.05	−0.10-−0.01	0.89	1416
	[*F*(3, 1412)=434.99, *P*<0.001] *Post hoc* Tukey's honest significant testing reveals a significant difference between all the subgroups (*P*<0.001)				
Frequency of junk food intake	≥4 times/week	0.87	0.79-0.95	0.56	212
	2-3 times/week	0.35	0.29-0.41	0.59	375
	Once/week	−0.12	−0.18-−0.06	0.67	473
	Don't eat	−0.93	−1.01-−0.86	0.73	356
	Total	−0.05	−0.10-−0.01	0.89	1416
	[*F*(3, 1412)=406.10, *P*<0.001] *Post hoc* Tukey's honest significant testing reveals a significant difference between all the subgroups (*P*<0.001)				
Frequency of breakfast consumption	≤2 times/week	1.11	0.99-1.22	0.56	88
	3-5 times/week	0.57	0.51-0.63	0.59	390
	6-7 times/week	−0.42	0.47-0.37	0.77	938
	Total	−0.05	−0.10-−0.01	0.89	1416
	[*F*(2, 1413)=391.56, *P*<0.001] *Post hoc* Tukey's honest significant testing reveals a significant difference between all the subgroups (*P*<0.001)				
Dietary behavior	Poor	0.87	0.81-0.93	18.9	273
	Fair	0.02	−0.03-0.06	56.0	771
	Good	−0.88	−0.96-−0.79	25.1	372
	Total	−0.05	−0.10-−0.01	0.89	1416
	[*F*(2, 1413) = 548.248, *P*<0.001] *Post hoc* Tukey's honest significant testing reveals a significant difference between all the subgroups (*P*<0.001)				

Z-scores [F(3, 1412) = 406.10, *P* < 0.001]. Higher junk food intake frequencies were also found to have a significantly higher mean BMI *Z*-score [F(3, 1412) = 434.99, *P* < 0.001]. Prior work has also revealed that there are significant effects of breakfast consumption frequency on BMI *Z*-scores at the *P* < 0.05 level for the three conditions: breakfast consumption less than or equal to twice a week, breakfast consumption three or five times a week, and breakfast consumption six or seven times a week [F(2, 1413) = 391.56, *P* < 0.001].[4] The results of ANOVA showed that the mean BMI *Z*-score (−0.88) of good dietary behavior was more protective against overweight or obesity, as compared to that of poor dietary behavior [F(2, 1413) = 548.248, *P* < 0.001].

Discussion

The results from this study indicate that the heterogeneity in eating behaviors and the prevalence of overweight or obesity has no gender preponderance. Despite the fact that this study was conducted in a nonmetropolitan city in India, the prevalence of adverse eating behaviors (obesity-related eating behaviors [OREBs]) shows high and statistically significant association with obesity and overweight. Almost a one-third of the studied population reportedly did not consume vegetables daily; this is an alarming dietary behavior because the empirical results show a significant association of lower frequencies of vegetable intake with obesity or overweight. Similar associations have been reported from Egypt,[17] Spain,[18] and other countries,[19,20] including the CURES study in South India.[21] Similarly, more than two-fifths of the studied population did not eat fruits every day although lower frequencies of fruit intake show significant association with overweight and obesity. Extant research has reported the association of lower fruit intake with overweight and obesity in other parts of the world.[17,22] The frequency of soft drink intake is found as high as twice or more daily in 11.4% of the studied population, and soft drink intake frequencies also show a significant association with overweight and obesity. Similar associations have been reported by prior work in other countries[17,20,23,24] and in India.[25] The results from our study further reveal that the higher frequency of soft drink intake has a significant association with mean BMI *Z*-scores too. Almost one-fifth of the school-going adolescents had breakfast less than three times a week; this is another alarming dietary behavior given the proposed effects of breakfast on obesity.[4]

This high prevalence of the adverse eating behaviors can also be called as OREBs, and they do not augur well for the socioeconomic future of a developing country like India, with an enormous adolescent population. The fact that OREBs have a substantial prevalence even in smaller cities, like Aligarh, is an issue of heightened public health concern as the New World Syndrome is supposedly far more prevalent in the metropolitan and bigger cities of India. A considerable social pressure to conform to current trends is driving the adolescents in adopting unhealthy eating patterns that may form the basis of their dietary habits for much of their lives.[26] Therefore, this penetration of coca-colonization, cultural hybridization, and adulation of

adverse eating behaviors, even in smaller cities of India, should be addressed at the earliest because the habits developed during adolescence generally continue into adulthood.

Our study sought to examine the prevalence of adverse eating behaviors in school-going adolescents of a tier-2 Indian city and their association with overweight, obesity, and BMI *Z*-scores. The study has found credible evidence to indicate the substantial prevalence of the adverse eating behaviors, with overall dietary behavior being good in only 26.3% of the population and poor in significant 19.3% of the population. The adverse eating behaviors show a significant association with overweight and obesity. Soft drink intake frequencies, junk food intake frequencies, breakfast consumption patterns, and overall dietary behavior scores show a significant influence on the mean BMI *Z*-scores.

Conclusions

In aggregate, our study finds poor dietary behavior in almost one-fifth of the school-going adolescents; this is undesirably high occurrence and a cause of public health concern, given that poor dietary behavior shows a significant association with overweight and obesity. The cumulative dietary behavior score can also be used as a composite index of OREBs. It fares better than the individual score as the cumulative score nullifies the individual vagaries and idiosyncrasies.

This study has a few limitations too. It is widely known that obesity is a multicausal disease, and eating behavior is just one of the causes. Moreover, eating behavior is neither a necessary nor a sufficient condition to cause obesity, which involves a complex interplay of multiple factors such as physical activity, sedentary lifestyle, and others. Nevertheless, as pointed out by Rothman and Greenland,[27] a cause needs not be either necessary or sufficient for its removal to result in disease prevention. If a component cause – even though it may be neither necessary nor sufficient – is blocked, a substantial amount of disease occurrence may still be prevented,[27] Another limitation of our study is that the frequencies of adverse eating behaviors are based on self-reporting. However, there is little reason to believe that the frequencies might have been reported differently by the obese and overweight adolescents as compared to the normal adolescents. Another important limitation of our study is that it does not have required data to factor in the amount of the food intake.

Nonetheless, this research is based on a substantive sample size among adolescents from a nonmetropolitan city that may well represent a microcosm of India, and its findings suggest that more research and timely intervention in adverse eating behaviors are much needed in India before the problem acquires more gigantic proportions. Experiences, outcomes, and policy interventions from the developed world may provide a few scientific evidences and recommended pathways for action for the developing countries to address the escalating problem of adverse eating behaviors. A school-based intervention among adolescents can be conducted as many adolescents are studying

in schools and that may provide an efficient opportunity to effectively reach out to the larger share of the targeted population beyond students themselves: school personnel, families, and community members.[28]

Conflicts of interest

There are no conflicts of interest

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