Lifestyle practices predisposing adolescents to non communicable diseases in Delhi

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A B S T R A C T

Background: Globally the prevalence of non- communicable diseases is on a rise. Adolescents are vulnerable to such diseases later on in life because of the susceptibility to behavioural risk factors like insufficient physical activity, unhealthy dietary practices and tobacco and alcohol consumption during this transition stage of their life. Adolescents who are from low-income families are also at increased risk of dual states of malnutrition such as underweight and obesity. So, this study aimed to estimate the prevalence of such behavioural risk factors among adolescents of low-income urban areas of Delhi.

Methodology: A cross-sectional study was conducted among 264 adolescents (10–19 years) of low-income Urban areas of Delhi.

Results: A total of 122 (46.2%) boys and 142 (53.8%) girls were enrolled in the study. The mean age of adolescents were 14.2 ± 2.4 years. The most prevalent NCD risk factor was physical inactivity (98.1% [96.4–99.7])). The screen time for television was significantly higher among boys than girls (*p* value 0.022). An age stratified analysis of risk factors showed that the intake of carbonated drinks (**p value 0.026**) and social media utilisation time (**p value 0.037**) was significantly higher among late adolescent boys (≥15 years) compared to early adolescents.

Conclusion: There is high prevalence of physical inactivity and unhealthy dietary behaviours among adolescents which could be a warning sign for prompt actions as they are at risk of NCD in future. Hence healthier practices should be promoted among adolescents at community level.

1. Background

Globally the burden of Non communicable diseases is said to be highest among Low- and Middle-income countries where 78% of all NCD deaths and 85% of premature deaths occur [1]. Thus, NCDs have become a global health challenge even among adults and young population which was earlier considered more prevalent among elderly. The major NCDs responsible for these deaths are cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. It was estimated that the probability of dying from one of the four main NCDs as 18%, with a slightly higher risk for males (22%) than for females (15%) [2]. The key behavioural risk factors for NCD were identified as harmful use of alcohol, tobacco use, unhealthy dietary behaviour and physical inactivity. These behavioural risk factors are linked with physiological changes such as Obesity, raised blood pressure, raised serum cholesterols and raised blood glucose which can further progress to onset of NCD.

NCDs are increasingly reported among adults and elderly, however because of the rapid urbanization and sociocultural transition the adolescents are also at the risk of it even at their young ages. Adolescents in India are facing a stage of dual burden of malnutrition and obesity. According to WHO, in India there is an increasing trend of obesity over the past two decades and is projected to further increase by 2025 [1]. Studies have shown that nearly about 1.7% of adolescent boys and 2.4% of adolescent girls were overweight and these could contribute to the rise in the proportion with pre-diabetes and hypertension in this age group [3,4]. Recent studies have shown that nearly half of adolescents have unhealthy dietary consumption of junk food and one-third had inadequate consumption of fruits and vegetables. Urban adolescent boys are higher at risk of such lifestyle changes than girls [5].

Adolescents are recommended to have a minimum of 60 min of moderate to vigorous physical activity daily and muscle strengthening exercises for at least 3 days in a week [6]. However, globally, 81% of adolescents aged 11–17 years were insufficiently physically active in 2010. Adolescent girls were less active than adolescent boys, with 84% versus 78% not meeting the WHO recommendation of 60 min of physical activity per day [7]. Recently in India, one-fourth of adolescents were found to be insufficiently physically active and was also reported more common among Urban girls [5]. Surveys done in India has shown a decline in prevalence of use of

tobacco and alcohol consumption over the last decade among adolescents but was reported more among adolescents of rural areas than Urban areas [5,8]. So, with this background the present study aimed to estimate the prevalence of behavioural risk factors for non-communicable diseases among adolescents of Low-income urban areas of Delhi.

2. Materials and methods

The study was conducted in two Low-income agglomerates of Urban Delhi in North east and Central districts. The study areas were catchment areas under the Community Medicine department of the institution. It was a community based cross-sectional study done during October 2020–March 2021. The sample size for study was calculated using the formula $(1.96)^2 PQ/D^2$ where P was combined prevalence of Obesity and overweight in Urban area as reported by Mathur P et al. - 15.4%, and absolute precision of 5% [5]. Thus, the calculated sample size came out to be 200 and with 10% attrition the total sample size was 220.

2.1. Methodology

The study instrument was an interview schedule which was prepared by the investigator after doing pretesting in a sample of 10 adolescents. The interview schedule covered details about the sociodemographic characteristics and risk factor assessment along with anthropometric assessment of adolescents. (Table 1). In each area, households were selected by systematic random sampling. The line list of households in each block was obtained with the help of frontline workers (ASHAs and Anganwadi workers). There was a total of 3201 households in the study area and a sampling interval was calculated as 12. Then standing at the first house in A block, the first household was selected by simple random sampling. A lot was taken by lottery method for selecting the first household and thereafter every 12th house was selected for the study. Similarly, it was done for all other blocks till the sample size was reached. From the selected household, adolescent in the age of 10–19 years was selected for the study. If there were more than one adolescent meeting the inclusion criteria in the selected household, then a single participant was selected through simple random sampling using the lottery method. If the participant was not present on the day of visit, they were covered in 2 subsequent visits. If a particular house was found locked on three consecutive visits, then the eligible study subject was dropped from the study and the next eligible participant was chosen. In case no eligible person was found then next systematic house was taken. The physical status of adolescents was assessed and BMI was plotted on WHO BMI growth reference chart for 5–19 years and adolescents were classified as overweight (BMI >1 SD) and Obese (>2SD) [9].

2.2. Statistical analysis

The data collected were entered in Microsoft excel and analysed using SPSS version 25. The quantitative data were expressed as mean and standard deviation or median and interquartile range and categorical data as frequencies and percentages. Chi-square test or Fisher Exact test was used to assess the difference between proportions. A *p* value less than 0.05 was taken as significant.

2.3. Ethics

Ethical permissions for the conduct of the study were obtained from Institutional Ethics Committee of Maulana Azad Medical College, New Delhi. The study was conducted after obtaining informed written assent /consent from the adolescents and informed written consent from the guardians of the adolescents. The adolescents who were found to have unhealthy lifestyle practices were counselled appropriately.

3. Results

The study was conducted among 264 adolescents. Th response rate was 93.8% among boys and 94.6% among girls. A total of 122 (46.2%) boys and 142 (53.8%) girls were enrolled in the study. The mean age of adolescents were 14.2 ± 2.4 years of which mean age of boys were 14.4 ± 2.3 years and that of Girls were 14.1 ± 2.4 years. The sociodemographic characteristic of the adolescents is shown in the Table 2. Poor intake of fruits were found to be more among girls (12%) than boys (7.4%) and poor intake of vegetables were more among boys (13.1%) than girls(12%) but no significant difference were observed. Intake of processed foods (78.4% [73.4–83.4]) and carbonated foods (80.3% [75.4–85.1]) were high among adolescents but no significant difference was found within gender. Prevalence of inadequate moderate to vigorous physical activity (98% [96.4–99.7]) and inadequate muscle strengthening exercises (94.3% [91.5–97.1]) was more among adolescents with no significant difference with gender. Increased screen time on computers, television and mobile phones add on to sedentary nature and it was observed that boys watched television for significantly higher duration than girls. **(p 0.022)**. (Table 3) An age stratified analysis of risk factors showed that the intake of carbonated drinks (**p 0.026**) and social media utilisation time (**p 0.037**) was

Table 1
Indicator of risk factors used in the present study.

Risk factor	Assessment in the survey	Definition used
Unhealthy diet	Frequency of consumption of fruits and vegetables (one standard serving as 80 g), intake of junk processed food and carbonated drinks in the past 7 days	< 3 portions of fruits and vegetables per day, ≥1 time/day of carbonated drinks and > 1 day/week of fast food.
Physical inactivity	Duration of Muscle strengthening exercises and moderate exercises done in the past 7 days Time spent on computers, television, messengers and social media	Less than 60 min per day of moderate-to-vigorous intensity, across the week and < 3 days a week of muscle strengthening exercises, screen time for television, computer, social media use and messengers >1 h/day
Tobacco consumption	Duration/frequency of Smoke-form and smokeless use of tobacco in the past 30 days	Current use of tobacco
Alcohol intake	Frequency of drinks of alcohol consumed in the past 30 days	Current use of alcohol

Table 2
Sociodemographic characteristics of the adolescents, N = 264.

Sociodemographic characteristics		Frequency	Percentage
Age	10–14 years	139	52.7
	15–19 years	125	47.3
Gender	Boys	122	46.2
	Girls	142	53.8
Socioeconomic Status*	I Upper	1	0.3
	II Upper Middle	51	19.3
	III Middle	115	43.6
	IV Lower Middle	90	34.1
	V Lower	7	2.7
Number of Siblings	None	11	4.2
	1	50	18.9
	2	117	44.3
	≥3	86	32.6
Number of family members	≤4	50	18.9
	5–7	204	77.3
	≥8	10	3.8
Education Status	Primary school	7	2.7
	Middle school	113	42.8
	High school	70	26.5
	Higher secondary and Above	74	28.0
Working Status of Parents	None of Them Working	10	3.8
	One of them Working	197	74.6
	Both Are Working	57	21.6
Type of family	Nuclear	181	68.6
	Joint	83	31.4

* Modified BG Prasad scale for the year 2020 September.

Table 3
Behavioural risk factors for NCD among the adolescents, N = 264.

Risk factors		Boys n(%)[95% CI]	Girls n(%)[95% CI]	Total n(%)[95% CI]	χ^2, df, P value
Poor intake of fruits		9(7.4)	17(12.0)	26(9.8)	1.56,1, 0.212
		[2.6–12.0]	[6.5–17.3]	[6.2–13.4]	
Poor intake of vegetables		16(13.1)	17(12.0)	33(12.5)	0.078,1,0.780
		[7.0–19.1]	[6.5–17.3]	[8.4–16.5]	
Intake of processed junk food		98(80.3)	109(76.8)	207 (78.4)	0.493,1,0.482
		[73.1–87.4]	[69.7–83.7]	[73.4–83.4]	
Intake of carbonated drinks		103(84.4)	109(76.8)	212(80.3)	2.438,1,0.118
		[77.9–90.9]	[69.7–83.7]	[75.4–85.1]	
Inadequate moderate to vigorous exercise (<7 days/week)		118(96.7)	141(99.3)	259(98.1)	0.185*
		[93.5–99.9]	[97.9–99.9]	[96.4–99.7]	
Inadequate muscle strengthening exercises		117(95.9)	132(93.0)	249(94.3)	1.061,1,0.303
(<3 days/ week)		[92.3–99.4]	[88.7–97.2]	[91.5–97.1]	
Screen time for computer (>1 h/day)		21(17.2)	14(9.9)	35(13.3)	3.086,1,0.079
		[10.4–24.0]	[4.9–14.8]	[9.1–17.3]	
Increased screen time for television (>1 h/day)		43(35.2)	32(22.5)	75(28.4)	5.213,1,**0.022**
		[26.6–43.8]	[15.5–29.4]	[22.9–33.8]	
Screen time for social media on phone (>1 h/day)		15(12.3)	12(8.5)	27(10.2)	1.056,1,0.304
		[6.3–18.2]	[3.8–13.0]	[6.5–13.9]	
Screen time for messengers in phone (>1 h/day)		14(11.5)	12(8.5)	26(9.8)	0.676,1,0.411
		[5.7–17.2]	[3.8–13.0]	[6.2–13.4]	
Current Tobacco use		1(0.8)	1(0.7)	2(0.8)	1.000*
Current use of Alcohol		3(2.5)	0(0.0)	3(1.1)	0.532*
BMI	Overweight	13(10.7)	12(8.5)	25(9.5)	4.332,2,0.115
	Obese	8(6.6)	3(2.1)	11(4.2)	
Total		122(100.0)	142(100.0)	264(100.0)	

* Fisher Exact test.

significantly higher among late adolescent boys (≥15 years) compared to early adolescents. No significant difference was observed among girls in two age groups for risk factors. (Table 4).

It was observed that the mean weight was more for Boys (45.1 ± 12.4 kg) than Girls (42.3 ± 9.8) and this difference in distribution was found to be statistically significant ($p < 0.05$). Similarly, BMI was higher for Boys (19.4 ± 4.8 kg/m^2) than Girls (18.4 ± 3.9 kg/m^2) but within the normal range and this difference was not significant statistically. Normal BMI was observed among 65.9% ($n = 174$) adolescents whereas 13.6% ($n = 36$) were having BMI > +1 SD (Overweight and Obese) and

20.5% ($n = 54$) were having Thinness (BMI < -2SD) as per WHO growth reference. Overweight and Obesity was more common among Boys than girls whereas thinness was found to be equally distributed among girls and boys.

4. Discussion

The present study determined the prevalence of behavioural risk factors like Unhealthy diet, physical inactivity, alcohol and tobacco consumption among adolescents and it was observed that adolescents could be at the

Table 4
Age stratified distribution of NCD risk factors among adolescents.

NCD risk factors		Gender			
		Boy		Girl	
		<15 years n (%)	≥15 years n (%)	< 15 years n (%)	≥15 years n (%)
Inadequate fruit intake	< 3 times/day	4 (7.2)	5 (7.4)	10 (11.9)	7 (12.6)
	P value	0.968		0.976	
Inadequate vegetable intake	< 3 times/day	4 (7.2)	12 (17.9)	12 (14.2)	5 (8.6)
	P value	0.083		0.307	
Intake of carbonated drinks	>1 time/day	42 (76.3)	61 (91.0)	64 (76.2)	45 (77.5)
	P value	**0.026**		0.847	
Intake of fast food	>Once a week	42 (76.3)	56 (83.5)	69 (82.1)	40 (68.9)
	P value	0.318		0.068	
Physically active for 60 min/day	< 7 days/ week	53 (96.3)	65 (97.0)	84 (100.0)	57 (98.2)
	P value	0.841		0.227	
Muscle strengthening exercises	<3 days/week	54 (98.1)	63 (94.0)	78 (92.8)	54 (93.1)
	P value	0.250		0.955	
Time spent on tv	> 1 h/day	19 (34.5)	24 (35.8)	19 (22.6)	13 (22.4)
	P value	0.883		0.977	
Time spent on computer	> 1 h/day	8 (14.5)	13 (19.4)	9 (10.7)	5 (8.6)
	P value	0.479		0.681	
Time spent on messengers	> 1 h/day	5 (9.1)	9 (13.4)	9 (10.7)	3 (5.1)
	P value	0.0.454		0.243	
Time spent on social media	> 1 h/day	3 (5.4)	12 (17.9)	8 (9.5)	4 (6.9)
	P value	**0.037**		0.580	
BMI	Overweight	3(5.4)	10(14.9)	7 (8.3)	5 (8.6)
	Obese	4(7.2)	4(5.9)	3 (3.5)	0 (0.0)
	P value	0.346		0.505	
Total		55 (45.1)	67 (54.9)	84 (59.2)	58(40.8)

brim of developing many NCDs in future owing to their current lifestyle practices.

In our study, the prevalence of poor intake of fruits and vegetables were lower compared to study done by Urmy et al. (90.7%) and Caleyachetty et al. (74.3%) which could be because of the difference in cut off chosen for poor intake [10,11]. Mathur P et al. in their national survey on risk factors for NCD among adolescents conducted in 2017 reported that only one third consumed fresh fruits for at least once a week [5]. Studies by Jain A et al. and Kumar S et al. had also reported inadequate amounts of fruits and vegetables intake and high consumption of fast food in the dietary habits of adolescents. [12,13].

The adolescents were found to have insufficient levels of physical activity in our study (98.1%) compared to previous studies by Urmy et al. in 2018–19, Mathur P et al. in 2017 (25.2%) and Caleyachetty et al. (71.4%) [5,10,11]. This difference could be due to the restrictions of the pandemic which started at the time of the study, due to which they were restrained from attending the schools and public places like playgrounds and gymnasiums which might have decreased the physical activity in them. Hence a higher proportion of prevalence was observed in the present study and also girls had higher proportion of inactivity than boys similar to previous study [7,10,14] The screen time for television was significantly higher for boys than girls but on age stratified analysis social media time was found to be significantly higher for late adolescents' boys. This could be because of the lockdown which had resulted in decreased outdoor plays. The use of tobacco was considerably lower in the study compared to other studies by Puwar T et al. who reported tobacco consumption among 2.2% boys and Urmy et al. (4.5%). [15] The prevalence of thinness was one fifth among study participants which was lower than that of the national average as per Comprehensive National Nutrition survey (CNNS 2016–2018) (24%). [16] Overweight and Obesity were higher than the national average observed in the CNNS (5% and 1% respectively) which was done during pre-pandemic period; however, the prevalence was only slightly higher than the state average of 12.2% [16]. The study was conducted among low-income areas which throws light on the fact that overnutrition along with undernutrition is also increasing among such communities as a menace. Obesity and overweight were more among adolescent boys than girls in this study similar to Puwar T et al., however Thakur S et al. and Urmy et al. has reported higher prevalence among girls. [10,15,17].

5. Conclusion

There is a high prevalence of physical inactivity among adolescents in the present study. The occurrence of Lockdown must have resulted in the restricted mobility of the adolescents and along with it the online learning which could have resulted in the increased screen time also might have led to the increased sedentary nature among them. In addition to this, multiple other risk factors like unhealthy diet, tobacco and alcohol consumption also would have an impact on the health of very young generations. Hence comprehensive public health interventions should be promoted among adolescents at community level for prevention of NCD risk factors.

6. Limitations

No diet survey was conducted and results are as reported by the adolescents. The study also did not look upon the parents' awareness about the risk factors for NCD. As baseline data for physical inactivity is not available, the COVID-19 restrictions would have aggravated the prevalence of physical inactivity in the present study.

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