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RESEARCH ARTICLE

Awareness Gaps in Adolescent Health: A Study on Non-Communicable Diseases and Their Risk Factors in Government Schools of Lucknow district.

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Abstract: Non-Communicable Diseases are among major public health problem for the India causing poverty trapping and barrier to sustainable development.About half of the premature deaths are related to health-risking behaviors that are often established during young age and extend to adulthood.This study was done to find the current status of awareness level about NCDs and their behavioral risk factors among adolescents. Methods: A cross-sectional study was conducted using two staged random sampling technique for selecting 320 school going adolescents of class 9th to 12thin urban and rural Government inter schools of Lucknow district. A pretested semi structured questionnaire was used to collect the required information and content validation was done. Results: Mean age of the participants was 15.79 years (SD ± 1.48)with both males and females accounting for equal number 160 (50%) out of 320 participants. Out of these, 193 (60.3%) belongs to urban area and 127 (39.7%) were of rural area. Males have 2.3 times more chance of having inadequate awareness than females and urban students have 1.6 times more chance of having wayinadequate awareness than rural students. About one-third of study population scored more than 50%. Conclusion: Overall awareness level about NCDs and their risk factors was very low, the present study suggests that there is need to focus more on health education interventions for NCDs, for which healthy settings approach for schools is a very feasible and effective.

Keywords: Awareness, Non-communicable Diseases, Risk factors, Adolescents.

INTRODUCTION

Non-communicable diseases (NCDs), including cardiovascular diseases, diabetes, cancers, and chronic respiratory conditions, have emerged as the predominant causes of mortality worldwide. According to the World Health Organization (WHO), NCDs account for nearly 74% of all global deaths, with over 80% occurring in low- and middle-income countries (LMICs) [1]. The scenario in India reflects this global patternNCDs contribute to approximately two-thirds of all deaths, and nearly one in five deaths occur prematurely before 70 years of age [2]. According to Global Burden of Disease (GBD) 2022 report states such as Uttar Pradesh are experiencing a increasing burden of NCDs, due to rapid urbanization, lifestyle transitions, and lowpreventive awareness [3].

Adolescence being a critical phase of life when foundation of long-term behavioral habits occurs, such as dietary patterns, physical activity, substance abuse, and coping mechanismsare established. Behaviors developed during this period often persist into adulthood, thereby elevating the risk of NCDs later in life [4]. Henceforth, identifying knowledge gaps and promoting healthy lifestyle practices among adolescents are vital steps for primary prevention of NCDs.

Multiple national initiativessuch as the National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD), the Fit India Movement, and the School Health and Wellness Ambassador Initiative under Ayushman Bharatawareness are taking place but understanding of NCD risk factors among Indian adolescents remain inadequate. Most of the studies from India have reported low awareness of the role of lifestyle factors in NCD causation, especially among students in government schools, who often lack access to structured health education programs [5–7]. Research from Uttar Pradesh and neighboringstates further have shown that, even where basic awareness exists, misconceptions and poor translation of knowledge into healthy practices remain common [8,9].

Given this background, adolescents constitute a strategic focus group for India's "75 by 25" initiative, which seeks to ensure 75 million individuals receive standard NCD care by 2025. Schools provide an effective platform for disseminating preventive health messages, as they reach a large and impressionable population within an organized framework. However, the design of evidence-based, school-centered health interventions necessitates a clear understanding of current awareness levels and the socio-demographic factors influencing them.

Therefore, the present study was conducted to assess awareness regarding NCDs and their modifiable risk factors among school-going adolescents in government

schools of Lucknow district, Uttar Pradesh, and to identify socio-demographic predictors associated with their level of knowledge.

MATERIAL AND METHODS

Study Design and Setting

A population-based cross-sectional study was conducted among school-going adolescents enrolled in classes 9th to 12th in government inter colleges of Lucknow district between September 2016 and August 2017. Adolescents who were present on the day of data collection and consented to participate were included. Students of class 8th and below, absentees, those unwilling to participate, and those unable to comprehend the questionnaire were excluded.

Sample Size and Sampling Technique

The minimum required sample size was calculated to be 273, based on an expected prevalence of 86.3% awareness of hypertension among adolescents [10], an absolute error of 5%, a 5% level of significance, and a design effect of 1.5. A multistage random sampling technique was employed. Initially, a list of all government inter colleges in both urban and rural Lucknow was obtained from the District Inspector of Schools (DIOS). Schools were then selected randomly from this list. From each selected school, 20 students were randomly chosen from each of the four classes (9th to 12th), resulting in 80 students per school. In total, 320 adolescents from four schools were included in
the study.

Study Tool and Data Collection

Data were collected using a pretested, structured questionnaire developed to assess awareness regarding non-communicable diseases (NCDs) and their risk factors. The tool included questions on demographic and socio-cultural characteristics such as age, sex, area of residence, religion, caste category, family type, parental education, and family history of NCDs. Awareness was assessed for several common NCDs, including hypertension, diabetes, asthma, cancer, and heart disease, along with behavioural risk factors such as inadequate consumption of fruits and vegetables, tobacco and gutka use, smoking, alcohol intake, low physical activity, and excessive salt intake.

For reference, the recommended minimum for adolescents—daily intake of at least 400 g of fruits and vegetables and 60 minutes of physical activity—was used. Students were also asked about common symptoms of diabetes (frequent urination, excessive thirst, numbness) and hypertension (headache, dizziness, blurred vision), as well as basic lifestyle measures for NCD prevention. The questionnaire consisted of 75 items. Awareness scores were categorised as “adequate” for scores ≥50% and “inadequate” for scores <50%. The complete questionnaire is provided in the supplement (Annexure 1).

Data Analysis

Data were analysed using IBM SPSS (Statistical Package for the Social Sciences) version 22.0. Categorical variables were summarized as frequencies and percentages. Associations between awareness levels and explanatory variables were assessed using the Chi-square test. A p-value of <0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of King George’s Medical University, Lucknow (Ref. code: 82nd ECM II-B Thesis/P50). Permission was also obtained from the District Inspector of Schools, Lucknow. Informed consent was taken from the principals of the selected schools, and verbal assent was obtained from all participating students before data collection.

RESULTS AND OBSERVATIONS:

Table 1 shows a total of 320 participants were included in the study, with a mean age of 15.8 years (SD ± 1.5). Equal representation was observed between males 160 (50%) and females 160 (50%). Of the total, 193(60%) were from urban areas and 127 (40%) from rural areas. Most of the participantswere Hindu 268 (83.7%), while only52 (16.3%) were Muslim. Majority of adolescents 260(81.2%) belong to nuclear families, compared to 60 (18.8%) from joint families.
Figure 2 shows awareness of non-communicable diseases (NCDs), the highest awareness was reported for **cancer (97.5%),** followed by **heart attack (93.8%).** In contrast, asthma was recognized by only 72.5%.

Figure 3 shows thatfrequent urination was most commonly identified as a symptom of diabetes (57.8%), and dizziness was the most recognized symptom of hypertension (81.9%).
Table 2 shows with respect to risk factor awareness, over 298 (93.4%) and 305 (95.3%) of adolescents identified smoking and chewing tobacco as causes of cancer respectively. For hypertension, 216 (67.5%) identified excess salt intake as a risk factor, but awareness of inadequate diet and insufficient physical activity was substantially lower. About128 (40%) recognized inadequate vegetable intake and 115 (35.9%) recognized inadequate fruit consumption as risk factors for hypertension. Awareness of chronic respiratory disease risk factors varied significantly by residence(p value< 0.01), with rural adolescents demonstrating greater awareness of tobacco as a risk factor.

Overall, only 35.6% of participants had adequate awareness, defined as a score of 50% or higher.

Table 3 shows among 320 participants, 14 (7.3%) of urban and 3 (2.4%) of rural residents consumed three or more bowls of green vegetables daily. Daily fruit intake of 1–2 servings was seen in 96 (49.7%) of urban and 72 (56.7%) of rural participants. About 143 (44.7%) consumed less than 5 g salt per day, and 121 (37.8%) in both groups performed at least 1 hour of physical activity daily.

Table 4 shows the association between selected bio-social characteristics and overall awareness of non-communicable diseases (NCDs) among students. Female students showed significantly higher awareness 72 (45%) than males 42 (26.3%), with an adjusted odds ratio (AOR) of **2.088 (95% CI: 1.292–3.375; p<0.001)**. Urban students were more aware than rural counterparts, with an AOR of **1.810 (95% CI: 1.103–2.972; p=0.037)**. Those with a positive family history of NCDs had greater awareness (AOR = **0.493; 95% CI: 0.300–0.811; p=0.007**). Other variables, including religion, caste, education, and family type, were not significantly associated with awareness levels.

Table 1: Distribution of study population by their biosocial characteristics

Bio-social Characteristic	Urban, n = 193 n (%)	Rural, n = 127 n (%)	Total, N = 320 n (%)
GENDER			
Male	104 [53.9]	56 [44.1]	160 [50.0]
Female	89 [46.1]	71 [55.9]	160 [50.0]
AGE OF ADOLESCENT(Years)			
Early (10 – 14)	34 [17.6]	23 [18.1]	57 [17.8]
Mid (15 -17)	146 [75.6]	90 [70.9]	236 [73.8]
Late (18 – 19)	13 [6.7]	14 [11.0]	27 [8.4]
Religion			
Hindu	153 [79.3]	115 [90.6]	268 [83.7]
Muslim	40 [20.7]	12 [9.4]	52 [16.3]
Caste			
General	70 [36.3]	25 [19.7]	95 [29.7]
OBC	83 [43.0]	62 [48.8]	145 [45.3]
ST/SC	40 [20.7]	40 [31.5]	80 [25.0]
Type of family			
Nuclear	151 [78.2]	109 [85.8]	260 [81.2]
Joint	42 [21.8]	18 [14.2]	60 [18.8]

Table 2: Awareness about the Risk Factors of common Non-Communicable Diseases

RISK FACTORS	URBAN n=193 n (%)	RURAL n= 127 n (%)	TOTAL N=320 n (%)	p-value
Aware of risk factors of Diabetes Mellitus				
Eating less green vegetables	72 (37.3)	57 (44.9)	129 (40.3)	0.176
Eating less fruits	60 (31.1)	34 (26.8)	94 (29.4)	0.407
Chewing tobacco / gutka	31 (16.1)	18 (14.2)	49 (15.3)	0.646
smoking	29 (15.0)	17 (13.4)	46 (14.4)	0.682
Drinking alcohol	35 (18.1)	22 (17.3)	57 (17.8)	0.853
Less physical activity	55 (28.5)	33 (26.0)	88 (27.5)	0.622
Aware of risk factors of Hypertension				
Having more salt in food	135 (69.9)	81 (63.8)	216 (67.5)	0.249
Eating less green vegetables	64 (33.2)	64 (50.4)	128 (40.0)	0.002
Eating less fruits	57 (29.5)	58 (45.7)	115 (35.9)	0.003
Chewing tobacco	32 (16.6)	21 (16.5)	53 (16.6)	0.992
smoking	36 (18.7)	26 (20.5)	62 (19.4)	0.687
Alcohol intake	50 (25.9)	33 (26.0)	83 (25.9)	0.988
Less physical activity	62 (32.1)	58 (45.7)	120 (37.5)	0.014
Aware of risk factors of Chronic respiratory diseases				
Chewing tobacco / gutka	45 (23.3)	50 (39.4)	95 (29.7)	0.002
smoking	71 (36.8)	64 (50.8)	135 (42.3)	0.013

Drinking alcohol	54 (28.0)	54 (42.5)	108 (33.8)	0.007
Eating less green vegetables	34 (17.6)	35 (27.6)	69 (21.6)	0.108
Eating less fruits	41 (21.2)	29 (22.8)	70 (21.4)	0.646
Less physical activity	63 (32.6)	49 (38.6)	112 (35.0)	0.489
Aware of risk factors of Cancer				
Eating less green vegetables	16 (8.3)	11 (8.7)	27 (8.4)	0.907
Eating less fruits	15 (7.8)	14 (11.0)	29 (9.1)	0.322
Chewing tobacco / gutka	182 (94.3)	123 (96.9)	305 (95.3)	0.291
smoking	181(93.8)	118 (92.9)	298 (93.4)	0.745
Drinking alcohol	154 (79.8)	111 (87.4)	265 (82.8)	0.078
Less physical activity	13 (6.7)	12 (9.4)	25 (7.8)	0.376

Table 3: Awareness about minimum recommendation of daily physical activity, green vegetables and fruits for prevention of Non-Communicable Diseases among study population

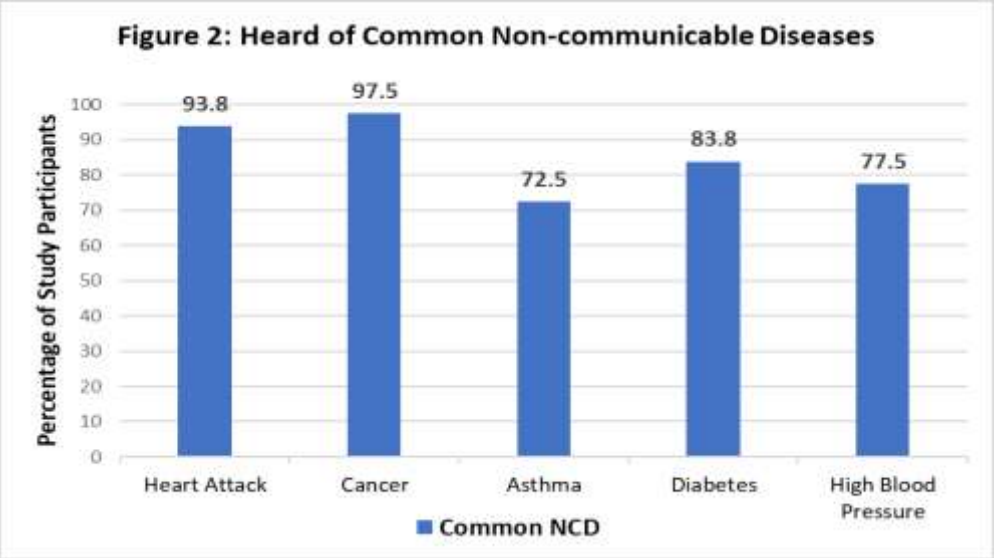
Variables	Urban, n= 193 n (%)	Rural, n= 127 n (%)	Total, N= 320 n (%)
Consumption of green Vegetables per day			
3 or more bowls	14 (7.3)	3 (2.4)	17 (5.3)
Fruits consumption per day			
1 to 2 servings	96 (49.7)	72 (56.7)	168 (52.5)
Salt consumption per day			
Less than 5 grams	85 (44.0)	58 (45.7)	143 (44.7)
Minimum time to be spend in a day for doing Physical Activity			
1 hour	73 (37.8)	48 (37.8)	121 (37.8)

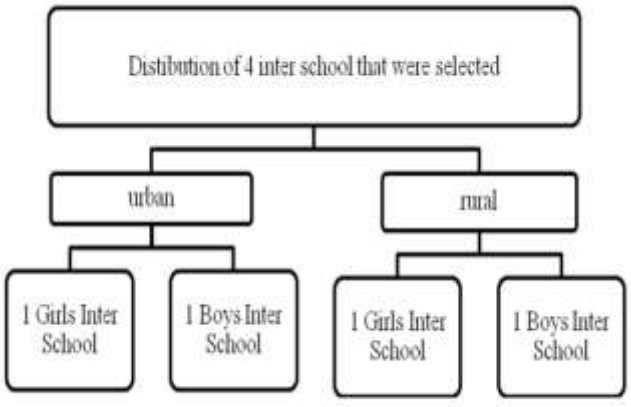
Table 4: Overall awareness level and factors responsible low awareness about NCD and their risk factors

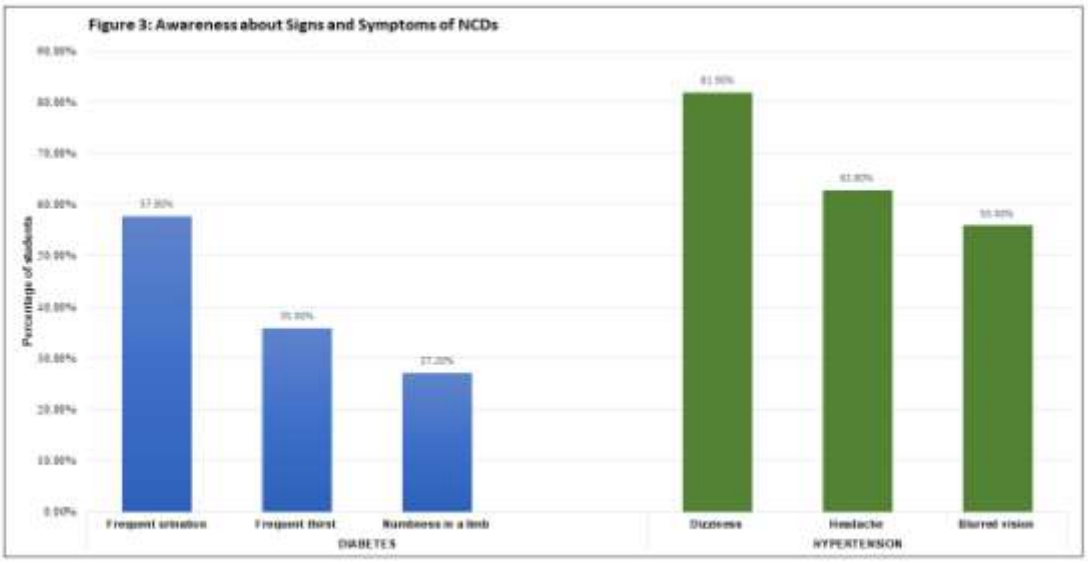
Bio-social Characteristics	Overall awareness level about NCD				p-value	OR	AOR
	Scored >= 50%		Scored < 50%				
	n = 114	%	n = 206	%			
GENDER							
Male (n= 160)	42	(26.3%)	118	(73.8%)	**<0.001**	**2.299 (1.437 – 3.678)**	**2.088 (1.292–0.375)**
Female (n= 160)	72	(45.0%)	88	(55.0%)		---------	-------
Religion							
Hindu (n= 268)	95	(35.4%)	173	(64.6%)	0.881	1.048 (0.565 - 1.944)	
Muslim (n= 52)	19	(36.5%)	33	(63.5%)		----------	
Class studying							
IX & X (n= 125)	45	(36.0%)	80	(64.0%)	0.911	0.974 (0.609 – 1.555)	
XI & XII (n=195)	69	(35.4%)	126	64.6%)		----------	
Caste							
SC/ST	28	(35.0%)	52	(65.0%)	0.893	1.037 (0.611 - 1.762)	
General/OBC	86	(35.8%)	154	(64.2%)		---------	
Residence							
URBAN	60	(31.1%)	133	(68.9%)	**0.037**	**1.640 (1.029 – 2.612)**	**1.810 (1.103–2.972)**
RURAL	54	(42.5%)	73	(57.5%)		-------	-------
Type of family							
NUCLEAR	97	(36.7%)	167	(63.3%)	0.365	0.750	

						(0.403 – 1.398)	
JOINT	17	(30.4%)	39	(69.6%)		---------	
Positive family history for NCD							
Present	55	(44.7%)	68	(55.3%)	0.007	0.529 (0.331 - 0.844)	0.493 (0.300- 0.811)
Absent	59	(29.9%)	138	(70.1%)		--------	------
Father Education							
Below High school	56	(31.1%)	124	(68.9%)	0.056	1.566 (0.988 – 2.484)	
Highschool and above	58	41.4%	82	58.6%		-------	
Mother Education							
Below High school	85	(33.9%)	166	(66.1%)	0.210	1.416 (0.821 – 2.441)	
Highschool and above	29	(42.0%)	40	(58.0%)		---------	

( ) row percent, OR= ODDS Ratio, AOR= Adjusted ODDS Ratio







DISCUSSION

The present study found that awareness regarding non-communicable diseases (NCDs) and their associated risk factors among school-going adolescents in Lucknow was generally low. Only about one-third (35.6%) of the participants demonstrated adequate knowledge (≥50%). Significant differences in awareness were observed by gender ($p < 0.001$), place of residence ($p = 0.037$), and family history of NCDs ($p = 0.007$). Female students and those with a positive family history of NCDs showed comparatively higher awareness. Given that adolescence is a critical period when lifestyle habits are formed and often carried into adulthood, these low levels of awareness are concerning.

These findings align with evidence from previous studies conducted across India that have reported suboptimal NCD-related awareness among adolescents. In a study conducted in Lucknow by Prasad (2015) [10], only 86.3% of students had heard of hypertension. Similarly, Shivalli et al. (2012) [5] reported poor understanding of diabetes and hypertension among school students in Varanasi. Although most adolescents in the present study recognized tobacco as a risk factor for cancer, only a small proportion linked lack of physical activity or unhealthy dietary habits with NCD development. This pattern is consistent with findings from the national adolescent survey by Mathur et al. [2], which observed that although tobacco use was widely acknowledged as harmful, awareness of dietary and physical activity-related risk factors remained low.

Gender and residential differences were also notable. Male adolescents had significantly lower awareness compared to females (AOR = 2.088, 95% CI: 1.292–3.375; $p < 0.001$), a trend similarly reported by Borle et al. [8] in Delhi, where females were found to engage more actively with preventive health messages. Interestingly, rural adolescents in this study exhibited marginally higher awareness (AOR = 1.810, 95% CI: 1.103–2.972; $p = 0.037$) than urban students, which may reflect the presence of school-based health education activities implemented through government programs in rural areas. Overall, awareness of the protective roles of fruits, vegetables, and regular physical activity remained low, with fewer than 10% of students identifying these as cancer-preventive behaviors.

Evidence from other studies supports the need for structured health education among adolescents. Jauhari et al. [9] reported that school-based interventions increased knowledge levels by up to one-third, although they emphasized that sustained behavior change requires continuous reinforcement. Similarly, Darukaradhya et al. [11] highlighted that many Indian NCD programs lack essential behavioral components such as peer counseling and goal-setting. Tiwari et al. [12], in their study from Uttar Pradesh, further noted that adolescent NCD prevention activities were poorly integrated into district health planning. Globally, similar trends have been observed in low- and middle-income countries, where adolescents recognize tobacco hazards but tend to underestimate the role of diet and physical activity.

POLICY AND PUBLIC HEALTH IMPLICATIONS:

Schools are a vital entry point for preventive health programs under initiatives such as the National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD) and the Fit India School campaign. Integrating NCD education into school curriculaparticularly through interactive, peer-led, and practical approacheshelp build long-lasting

awareness. The Health and Wellness Ambassador component of Ayushman Bharat provides a platform to implement interventions with periodic reinforcement.

STRENGTHS AND LIMITATIONS:

The study include a representative sample from both urban and rural schools. However, as a cross-sectional study, it cannot establish causality or long-term changes. Self-reported responses may be influenced by recall bias, and the exclusion of private schools limits generalizability.

CONCLUSION

The study showed that awareness regarding non-communicable diseases (NCDs) and their modifiable risk factors among school-going adolescents in Lucknow was low. Most of the students recognized the harmful effects of tobacco and alcohol, only few were aware of the importance of physical activity and a healthy diet in preventing NCDs. The factors such as male gender, urban residence, and absence of family history of NCDs were associated with lowawareness levels among adolescents.These study findings emphasize the need for targeted, school-based health education programs that focus on lifestyle modification and early NCD prevention. Initiatives such as integrating NCD education into the school curriculum can help bridge existing knowledge gaps and foster healthier behaviors among adolescents.

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