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Original Article

Why The Knowledge of Indian School-Going Adolescents Regarding NCDs is Not Transforming into Lifestyle Changes?

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Abstract

Background: There is a paucity of research to demonstrate the quantification of adolescents' risk behavior toward Non-Communicable Diseases (NCD) in India. This study aims to explain the knowledge of school-aged adolescents about NCD and whether their knowledge is truly translating into lifestyle changes and if not, what are the potential underlying factors responsible for that.

Methodology: A school-based cross-sectional study was conducted on adolescents in Jodhpur district, India, in grades 6 to 12. The data was gathered via a semi-structured questionnaire. The participant's weight and height were assessed using a digital weighing machine and a stadiometer, respectively. SPSS v.23 was used to analyze the data. Univariate (chi-square) and multivariate (logistic regression) analysis were used to quantify knowledge and risk factors, and inferences were derived.

Results: A total of 1010 students participated in the study. The mean scores of knowledge and risk behavior were 32.82±6.43 (out of 40) and 9.23+2.63 (out of 30), respectively. Adolescent risk behavior and knowledge were not found to be significantly related. Physical activity, spending fewer hours sitting, not skipping breakfast, and habit of fruit and vegetable consumption were significant factors for a healthy lifestyle among them.

Conclusion: Due to differences in underlying predictors, adolescents' understanding of NCDs did not translate into healthy lifestyle modifications. These findings highlight the importance of developing tailored interventions for adolescents that target identified risk domains.

Keywords: Adolescents; NCDs; Knowledge; Lifestyle; Risk factors.

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Introduction

Rapidly increasing globalization and urbanization have accelerated the pace of social, economic and cultural transition, which has led to tremendous changes in the lifestyles of people. These changes have increased the propensity to developing diseases related to lifestyle, which are non-communicable and chronic in nature. Other than these behavioral and environmental issues, genetic and physiological factors also play an important role in the development of non-communicable diseases in countries like India, a combination of those different factors had brought down the age of onset of NCDs a decade earlier than the developed countries. Unfortunately, these NCDs remain undiagnosed for a long time, and are sometimes diagnosed with complications due to lack of awareness.

As of now diseases burden due to NCDs is higher than communicable diseases in all the states of India, and this epidemiological transition was completed in 2016. It is an alarming situation now, as NCDs have huge proportional contribution (nearly 60%) to the total mortality in the country. In such situations prevention at all levels (primordial to tertiary) is of paramount importance. For effective prevention of NCDs at primordial and primary level in any country, adolescents of that country must be equipped with sufficient knowledge about various NCDs, its risk factors, complications and have favorable attitude for its prevention and treatment. Besides that, it is vital to prevent and avert the risk factors of NCDs in this age group. Because these risk factors usually laid down during adolescence period, which is 10 to 19 years of age group, and wrong practices or habits continues throughout adulthood. Early education to school students has a significant impact in the prevention of NCDs. World Health Organization has also highlighted the need of an urgent public health response to address specific health needs of adolescents in this direction.

But, before imparting the education or training at national or regional level, it is imperative to assess the existing risk factors to develop the focused preventive approaches. Simultaneously, assessment of the knowledge of students about NCDs is also essential, as knowledge is considered as the prime factor responsible for behavior changes and this may vary according to different geographical settings in the country.

After literature search it was observed that there is sufficient scientific evidence regarding measurements of the knowledge and risk factors of NCDs among adolescents in Indian context. But there is lack of evidence to show the quantification of the risk behavior of adolescents towards NCDs and to explain whether knowledge is really associated with their lifestyle. It was sensed that the underlying predictors of knowledge and lifestyle may be different from each other in this particular age group and needs detailed explanation for development of customized preventive measures. With this background, this study was planned with the objectives to assess and quantify the knowledge and existing risk factors for the development of NCDs among school going students and to find out whether the knowledge is really transforming into lifestyle, and if not so, what are the potential underlying factors responsible for that.

Subjects and Methods

This was a school based cross sectional study which was conducted for six months (March 2019 to September 2019) in urban and rural schools of Jodhpur district of Rajasthan State in India. Adolescents (10-19 years), studying in above primary classes (6th to 12th) were included in the study. Based on literature search, it was found that the knowledge for non-communicable diseases among school going adolescents in India varies widely (30 % to 80%). Considering the minimum level of prevalence as 30%, 10% relative margin of error, 10% non-responses, the sample size was calculated by formula z2pq/L2. The final sample size was rounded up and fixed as 1000 and was equally distributed between urban and rural area.

A list of all the government schools in Jodhpur district having classes 6th to 12thwas procured from District Education Officer (DEO), Jodhpur, and the same was adopted as sampling frame. From that list, fiveurbans (Basni, Jalori gate, Sardarpura, Shastri Nagar and Khame ka kua) and five rural (Dhawa, Keru, Babdu kala, Boranada and Gangana) government schools were selected by simple random sampling. Students from each school were selected based on availability at school and in respective classes on the day of the survey. For conduction of the study due clearance was taken from the institutional ethics committee and a prior written permission was obtained from District Education Officer (DEO), Jodhpur and the school's authorities.

According to the objectives, a self-administered, semi structured questionnaire was prepared. The questionnaire was translated into vernacular and the translation was validated after retranslation with the help of language experts. A pilot testing of questionnaire was done on 40 students in a school which was not selected for the study. Before commencing the study, Principal/Headmaster and all class teachers were explained about the purpose of the study. Then the questionnaire along with accent form were distributed to students in classes and objective of the study was explained.

One by one questions were read by the investigator and students were instructed to fill it carefully. For each group of students, a duration of 60 minutes was taken to fill the questionnaire.

First part of the questionnaire was having 14 questions related to socio-demographic information. The second part was meant for assessment of knowledge about NCDs and was having 40 questions which were divided into four sections (awareness about different NCDs, risk factors, complications and prevention of NCDs).

Third part of the tool was dealing with assessment of existing risk factors of NCDs among respondents. Weight of all the participants was measured with the help of digital weighing machine, and height was measured with stadiometer. BMI percentiles were calculated and categorized as undernourished (<5th percentile), normal (5th to 85th percentile), overweight/obese (>85th percentile).

Data was analyzed using SPSS v.23. Appropriate tables were prepared, and inferences were drawn using univariate (chi-square) multivariate (binary logistic regression) analysis. P value<0.05 was considered as statistically significant.

Results

A total of 1010 students (509 urban and 501 rural) participated in the study. The sociodemographic attributes of participants are mentioned in additional files (Tables S1 & S2). The responses for knowledge related variables are given in Table S3. Each of the right responses was given one score. Thus, the total knowledge score was ranging from zero to 40 (higher score represents more knowledge). The mean knowledge score for the students was 32.82+6.43. Based on the mean value, the knowledge score was divided in to two categories ≤33 (poor) and >33 (good). Each risk factor was also assigned score to quantify the risk behavior (Table S4). The total score was ranging from zero to 30 (higher score represent risky behavior). The mean score for the risk factors was 9.23+2.63. Based on the mean value, the score was divided in to two categories ≤9 (lower risk) and >9 (higher risk).

Table 1 depicts that knowledge and risk behavior of adolescents was not significantly associated with each other.

Table 2 depicts that risk behavior score was significantly positively correlated with knowledge score, that means if knowledge was increasing the behavior was significantly becoming risky towards development of NCDs.

The predictors of both knowledge and lifestyle were explored. Table 3 & 4 depicts that, students residing in rural areas, whose fathers were better educated (above primary) and who were living in relatively larger families (>5 members) were significantly better knowledgeable as well as living healthy lifestyle. Students belonging to Muslim religion were significantly more knowledgeable, while Hindu students were having significantly lower risk of developing NCDs. Lifestyle of middle and late age group adolescents (14 to 19 years), who were belonging to OBC/Other caste category and residing in nuclear families, was significantly better as compared to their counterparts. Age, Caste and type of family were not the predictors for knowledge of adolescents. Girls were significantly more knowledgeable about NCDs than boys. Students having less number of siblings (≤2) were having significantly better knowledge as compared to their counterparts. Gender and number of siblings were not significantly influencing the risk behavior of adolescents.

Significant predictors of risk behavior were further explored to find out the underlying reasons of differences in lifestyle. Middle and late age group adolescents were having significantly better habits of fruit consumption, not skipping breakfast and doing physical activities. They were also having significantly better lifestyle in terms of spending less hours in sitting on daily basis. These healthy lifestyle practices were also reflecting in their nutritional status. But significantly more number of students in this age group were having bad habits of addictions and less consumption of vegetables as compared to their counterparts. Students belonging to Hindu religion were significantly more physically active in terms of doing regular moderate or vigorous physical activities and spending less hours in sitting on daily basis. Family history of NCDs was also significantly less among Hindus. But dietary practices were significantly better among Muslim students. Adolescents belonging to OBC/Others caste categories were having significantly better habits of vegetable consumption, but they were spending more hours in sitting on daily basis. Rural students were significantly more physically active. Family history of NCDs was also significantly less among them. But habit of fruit and vegetable consumption and not skipping breakfast on daily basis was significantly better among urban students. Children of educated fathers were having significantly better practices of daily fruit consumption and not skipping breakfast. But they were spending more hours in sitting on daily basis. The differences in lifestyle of adolescents belonging to nuclear and joint families was attributed to family history of NCDs. Students living with large families (>5 members) were significantly more physically active. (Table 5).

Table 1: Association of knowledge with risk behavior

		Risk score		Total	p value
			>9		
Knowledge score	>33	300 (56.1)	235 (43.9)	535	0.29
	≤33	282 (59.4)	193 (40.6)	475	
Total		582 (57.6)	428 (42.4)	1010	

Table 2: Correlation between knowledge and risk behavior of adolescents

	Knowledge Score	Risk score
Pearson Correlation	1	0.106
Sig. (2-tailed)		0.001

Table 3: Predictors of knowledge of adolescents about NCDs

Variables		>33 (good)	≤33 (poor)	Total	OR(95%CI)	AOR(95%CI)
Age (years)	14-19	372(56.4)	288(43.6)	660	1.48(1.14-1.92)*	1.32(0.93-1.88)
	10-13	163(46.6)	187(53.4)	350	1	1
Gender	Girls	363(56.8)	276(43.2)	639	1.52(1.18-1.97)*	1.71(1.26-2.31)*
	Boys	172(46.4)	199(53.6)	371	1	1
Religion	Muslim	64(61)	41(39)	105	1.44(0.95-2.17)	1.95(1.23-3.1)*
	Hindu	471(52)	434(48)	905	1	1
Caste	OBC/Others	341(51.8)	317(48.2)	658	0.88(0.68-1.14)	0.77(0.58-1.02)
	SC/ST	194(55.1)	158(44.9)	352	1	1
Residence	Urban	263(51.7)	246(48.3)	509	0.9(0.7-1.15)	0.53(0.38-0.73)*
	Rural	272(54.3)	229(45.7)	501	1	1
Class	>8th	295(57.5)	218(42.5)	513	1.45(1.13-1.86)*	1.29(0.91-1.81)
	≤8th	240(48.3)	257(51.7)	497	1	1
Education Father	Above Primary	343(57.3)	256(42.7)	599	1.53(1.19-1.97)*	1.58(1.18-2.12)*
	Up to Primary	192(46.7)	219(53.3)	411	1	1
Occupation Father	Unskilled Job	289(53.8)	248(46.2)	537	1.08(0.84-1.38)	1.14(0.87-1.5)
	Skilled Job	246(52)	227(48)	473	1	1
Education Mother	Above Primary	260(56.6)	199(43.4)	459	1.31(1.02-1.68)*	1.27(0.95-1.71)
	Up to Primary	275(49.9)	276(50.1)	551	1	1
Occupation Mother	Housewife	463(53.3)	406(46.7)	869	1.09(0.77-1.56)	1.02(0.7-1.48)
	Working	72(51.1)	69(48.9)	141	1	1
Type of family	Nuclear	328(52.6)	295(47.4)	623	0.97(0.75-1.25)	1.25(0.94-1.67)
	Joint	207(53.5)	180(46.5)	387	1	1
Family size	>5	388(55.8)	307(44.2)	695	1.44(1.11-1.89)*	2.03(1.43-2.88)*
	≤5	147(46.7)	168(53.3)	315	1	1
Siblings	≤2	174(55.8)	138(44.2)	312	1.18(0.9-1.54)	1.62(1.17-2.26)*
	>2	361(51.7)	337(48.3)	698	1	1

*p<0.05

Table 4: Predictors of risk behavior of adolescents regarding NCDs

Variables		≤9 (good)	>9 (poor)	Total	OR(95%CI)	AOR(95%CI)
Age (years)	14-19	390(59.1)	270(40.9)	660	1.19(0.92-1.54)	1.44(1.02-2.05)*
	10-13	192(54.9)	158(45.1)	350	1	1
Gender	Girls	351(54.9)	288(45.1)	639	0.74(0.57-0.96)*	0.87(0.64-1.17)
	Boys	231(62.3)	140(37.7)	371	1	1
Religion	Muslim	47(44.8)	58(55.2)	105	0.56(0.37-0.84)*	0.58(0.37-0.9)*
	Hindu	535(59.1)	370(40.9)	905	1	1
Caste	OBC/Others	389(59.1)	269(40.9)	658	1.19(0.92-1.55)	1.36(1.03-1.8)*
	SC/ST	193(54.8)	159(45.2)	352	1	1
Residence	Urban	268(52.7)	241(47.3)	509	0.66(0.52-0.85)*	0.71(0.52-0.98)*
	Rural	314(62.7)	187(37.3)	501	1	1
Class	>8th	296(57.7)	217(42.3)	513	1.01(0.78-1.29)	0.83(0.59-1.17)
	≤8th	286(57.5)	211(42.5)	497	1	1
Education Father	Above Primary	357(59.6)	242(40.4)	599	1.22(0.95-1.57)	1.39(1.04-1.86)*
	Up to Primary	225(54.7)	186(45.3)	411	1	1
Occupation Father	Unskilled Job	299(55.7)	238(44.3)	537	0.84(0.66-1.08)	0.97(0.74-1.28)
	Skilled Job	283(59.8)	190(40.2)	473	1	1
Education Mother	Primary and above	253(55.1)	206(44.9)	459	0.83(0.65-1.07)	0.86(0.64-1.16)
	Up to Just Literate	329(59.7)	222(40.3)	551	1	1
Occupation Mother	Housewife	498(57.3)	371(42.7)	869	0.91(0.63-1.31)	0.94(0.65-1.37)
	Working	84(59.6)	57(40.4)	141	1	1
Type of family	Nuclear	372(59.7)	251(40.3)	623	1.25(0.97-1.61)	1.43(1.07-1.91)*
	Joint	210(54.3)	177(45.7)	387	1	1
Family size	>5	412(59.3)	283(40.7)	695	1.24(0.95-1.62)	1.45(1.03-2.04)*
	≤5	170(54)	145(46)	315	1	1
Siblings	≤2	173(55.4)	139(44.6)	312	0.88(0.67-1.15)	0.94(0.68-1.29)
	>2	409(58.6)	289(41.4)	698	1	1

*p<0.05

Table 5: Variables significantly (p<0.05) associated with prediction of risk behavior (%)

	Age		Religion		Caste		Residence		Education Father		Type of Family		Family size	
	L	E	M	H	O	S	U	R	A	B	N	J	>5	<5
Fruit freq. per week														
Everyday	28.3	26.6	50.5	25.1			46.8	8.4	32.2	21.2				
4-6 days	31.1	23.1	13.3	30.1			19.3	37.5	30.2	25.5				
...	38.3	49.1	35.2	42.9			31.8	52.5	35.7	51.3				
Null	2.3	1.1	1	2			2.2	1.6	1.8	1.9				
Vegetable freq. per week														
Everyday	87.4	93.7	95.2	89	91.2	86.6	92.1	87						
Irregular	12.6	6.3	4.8	11	8.8	13.4	7.9	13						
Vegetable serving per day														
>2 servings	44.4	59.4	26.7	52.3			23.4	76.2	43.4	58.6				
≤2 servings	55.6	40.6	73.3	47.7			76.6	23.8	56.6	41.4				
Breakfast														
Never skip	20	12.9					33.6	1.2	22.4	10.5				
Invariably skip	21.7	8.6					28.9	5.2	20	12.9				
Never do	58.3	78.6					37.5	93.6	57.6	76.6				
Physical activity (minutes)														
Daily ≥60	15	9.1	2.9	14.1			11.6	14.4					13.7	11.4
Daily <60	48	60.6	51.4	52.5			50.1	54.7					54.8	47
Irregularly ≥60	1.2	0	1	0.8			0.8	0.8					0.3	1.9
Irregularly <60	22.4	17.7	29.5	19.8			20.6	21					20.9	20.6
None	13.3	12.6	15.2	12.8			16.9	9.2					10.4	19
Time spent sitting/reclining per day (hours)														
≤4	29.4	20.6	10.5	28.2	23.6	31.5	18.1	34.7	25.7	27.3			26.3	26.3
5-8	55.9	75.7	73.3	61.5	64.6	59.4	67.4	58.1	61.1	65.2			64.7	58.4
>8	14.7	3.7	16.2	10.3	11.9	9.1	14.5	7.2	13.2	7.5			8.9	15.2
Nutritional status														
Normal	67.9	61.7												
Underweight	24.1	30.6												
Overweight	7.9	6.6												
Obese	0.2	1.1												
Any addiction	3.6	0.6												
Any FH			74.3	60			76.6	46.1			57.8	67.4		

*Age (L-Middle & Late, E-Early), Religion (M- Muslim, H-Hindu, Caste (O-OBC/Others, S-SC/ST), Residence (U-Urban, R-Rural), Education Father (A-Above Primary, B-Below Primary), Type of Family (N-Nuclear), J-Joint), FH-Family History of NCDs.

Discussion

This study has tried to explore and quantify the knowledge and risk behaviors of NCDs among school going adolescents in Jodhpur district. The definitive application of the knowledge is to improve the lifestyle of adolescents by incorporating healthy behaviors among them. But this study found that the knowledge was actually not transforming into the behavior changes towards healthy lifestyle, and rather it was negatively correlated.

The present study highlights that the students were having decent knowledge about NCDs. Variable level of awareness in this regard among school students and adolescents have been reported by many authors in India. This variation may be attributed to different study settings and methodologies adopted by different authors.

Constantly rising unhealthy eating pattern and physical inactivity during adolescence is gradually culminating into earlier onset and increasing burden of NCDs. As per WHO, physical activity is one of the most effective approaches to prevent NCDs. Near about two third of the students reported of doing some form of moderate or vigorous activity on daily basis in this study (although it was not meeting WHO recommendations). Variable findings in this regard have been documented by various studies across India. Similar to the present study, inadequate amount of fruits and vegetables intake has been reported in India by many authors.–More meals eaten outside home and school are associated with higher unhealthy diet pattern among adolescents, which push them towards risk of developing NCDs. This malpractice was also prevalent among school students of Jodhpur district.

Although knowledge was insignificantly different across different age groups of adolescents, yet lifestyle of middle and late age group adolescents (14 to 19 years) was significantly better due to habits of fruit consumption, not skipping breakfast, doing physical activities and spending less hours in sitting on daily basis. This may be due to the fact that body image consciousness increases with age among adolescents. And physical activity, body image and eating attitude are related to each other. The changes in lifestyle with age may also be attributed to the constant and concentrated IEC efforts by the Government of India at various platforms including schools. This statement can be supported by the further analysis of the data of this study, which shows that 81.9% students acknowledged school teacher as the main source of their information. Importance of dissemination of health education by school teachers on advancing the behavior of students toward primordial prevention for NCDs has been proved by Prasad S et.al. (2017).

Increasing prevalence of childhood obesity is really a global concern. In developing countries like India, where still we are struggling with the problem of undernutrition, this has created a havoc, because both types of malnutrition (underweight and overweight) are linked with development of NCDs in future. Similar picture is reflected in the present study, where around one fourth of the students were underweight and nearly 8% were overweight or obese. Wide variability in the prevalence of overweight and obesity among adolescents have been observed across India. The nutritional status was significantly varying according to their age groups in the present study. The early age adolescents were more underweight as compared to middle and late age adolescents. This may be due to the steep growth spurt in height during puberty in the early age group adolescents.

In the present study, the prevalence of tobacco consumption by students was very low as compared to the findings reported by other studies and reports of Global Youth Tobacco Survey (GYTS) 2009. Unlike other studies, statistically significant difference in substance abuse between rural and urban students was not observed in the present study. But the history of addictions was significantly more among middle and late age group adolescents as compared to early age group. Other Indian studies also support this observation.

Girls were significantly more knowledgeable about NCDs, but as far as their lifestyle is concerned, it was not significantly different from boys. This finding is contrary to the observations which prove that girls in India are less physically active because they spend their leisure time in sedentary activities due to lack of parental or social support for outdoor games or activities. Besides that, they are also more image conscious than boys, which affect their physical activity and eating attitude.

Students belonging to Muslim religion were significantly more knowledgeable. But being significantly more physically active, Hindu students were at significantly lower risk of developing NCDs. But dietary practices were significantly

better among Muslim students. Though evidence shows that religiosity does not have any association with changes in physical activity and diet.

In the present study, although caste was not having any significant association with the knowledge, it was a predictor of risky behavior for NCDs due to long hours of physical inactivity and habits of vegetable consumption on daily basis. Contrary to this, Jayanna K. et.al., (2019) did not observe any significant difference in the distribution of NCD risk factors (physical activity and dietary practices) based on caste categories.

Rural students were significantly better knowledgeable as well as more physically active in terms of regular physical activities and spending less sitting hours per day. Association of long sitting hours with NCDs is a proven fact. These finding can be supported by results from many studies and surveys in India. On the other hand, dietary practices were significantly better among urban students. These findings are contrary to the findings reported by Tripathy J.P. et.al, (2016), who observed no significant urban-rural differences in dietary habits and physical activity in India.

Skipping breakfast has been identified as an easy marker for the risk of development of overweight and obesity among children and adolescents and significantly increases the risk of mortality from cardiovascular disease among adults. The habit of regular breakfast consumption was very poor (almost negligible) in rural students in the present study. Contrary to this, Arora M et.al (2012) found that 70% school students in Delhi were having habit of regular breakfast consumption.

It is quite a well-known fact that family history of any NCD is a non-modifiable risk factor for the development of NCDs in future generations. In the present study, urban students reported significantly more positive family history for almost all the kinds of NCDs, as compared to their rural counterparts. This may be due to the iceberg phenomenon for NCDs, which was more prevalent in rural areas in the era of previous generations as compared to urban area. This statement is supported by ICMR-INDIAB (ICMR-India Diabetes) study, which has reported that the ratio of undiagnosed to diagnosed diabetes is higher in rural areas as compared with urban areas. Other reason for this is due to difference in lifestyle between urban and rural people.

Father's education was playing a significant role in improving the knowledge as well as lifestyle of adolescents. A systematic review by Williams J. et. al., (2018) strongly supports this observation. But at the same time children of educated fathers were spending more hours in sitting on daily basis. This may be due to spending long hours in studies due to pressure/influence of educated family.

Conclusions

To design or customize the health promotion interventions for NCDs, it is always important and necessary to pinpoint and target the exact predictors of the knowledge as well as lifestyle. The level of knowledge about NCDs was although decent but not up to the mark. Different modifiable and non-modifiable risk factors for NCDs were quite prevalent among school students of Jodhpur.

Residence in rural area, fathers' education and living in large families (>5 members) were significant predictors of both better knowledge as well as lifestyle. Students belonging to Muslim religion were significantly more knowledgeable, while Hindus were at significantly lower risk of developing NCDs. Age, caste and type of family were predictors for lifestyle only, while gender and number of siblings were exclusive predictors of knowledge. Class in which students were studying, occupation of father, and educational and occupational status of mother were neither affecting the knowledge nor the lifestyle of adolescents in the study area.

Due to difference in underlying predictors, the knowledge and lifestyle were not found associated or positively correlated with each other. These findings reinforce the need to develop the customized interventions and proper counselling of adolescents targeting identified risk domains. So that the risk of developing NCDs burden in near future can be brought down.

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