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Original Research Article

Rapid screening for behavioral risk factors in adolescents in North India

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ABSTRACT

Background: Habits get established during the transitional age of adolescence making it important to conduct surveillance to detect high risk behaviours at an early age. Feasibility of such a surveillance system was tested for monitoring the risk factors in schools.
Methods: A cross sectional survey was conducted in randomly selected schools of Chandigarh in India, by enrolling 226 students of class V to XII. A pretested structured questionnaire on dietary pattern, physical activity, tobacco and alcohol consumption, drug abuse, mental health, sexual behaviour etc., was administered after ensuring privacy and confidentiality.
Results: A total of 226 students with a mean age of 14years (range 10 to 19years) participated in the study. The prevalence of tobacco use was 8%, alcohol consumption was 3%, and drug abuse was 4%. About 47% were involved in a physical fight. Around 7% students were overweight. About 50% of the students skipped breakfast during previous week, and 6% had no intake of fruits and vegetables in last one month. Only 53% reported consistent use of seat belts.
Conclusions: Several behavioral risk factors were prevalent among school children in Chandigarh. Behaviour surveillance to monitor trends should be conducted at regular intervals.

Keywords: Surveillance, Behavioural risk factors, Survey, Adolescent, School health, Non-communicable diseases

INTRODUCTION

Industrialization and technology advancement have led to many changes in the lives of people. "Risk Transition" is happening in many parts of the world.[1] Several risk factors like sedentary life style, unhealthy food intake, physical inactivity, smoking, alcohol consumption, multi-partner sex are on the rise. These factors have also led to increased risk of many non-communicable diseases (NCDs) such as cardiovascular diseases, chronic respiratory diseases, diabetes, cancer, mental disorders, injuries, and some communicable diseases such as HIV/AIDS.

According to the Population Reference Bureau, 80% of NCD deaths occurred in lower-income countries.[2] Many risk factors for NCDs including tobacco, alcohol use, and diets high in fat, salt and sugar are established during adolescence. Apart from these, stress is another risk which may result in ill health. In the United States, suicide rates doubled in the 15 to 19 year age group and tripled in the 10 to 14year age group between the 1960s and the 1990s.[3]

Many serious diseases of adulthood have their roots in the behaviors acquired during adolescence.[4] Adolescents represent the development potential of a society. Their good health helps ensure independence, security, and

productivity across the life course. The transition in behaviors starts occurring rapidly in adolescent period when children start interacting with other people around them.

Hence, life skill programs have been introduced in Indian schools.[5] School health surveys have also been initiated to monitor these programs. However, most of these surveys either cover only few selected risk factors or have a complex design covering too many risk factors. Rapid survey approach is needed, like "30X7" approach for monitoring Expanded Program on Immunization, with a focus on most important risk factors.[6] Hence, we designed a rapid survey using a self-administered questionnaire for surveillance of several behavioral risk factors among school children of Chandigarh. We wanted to determine the prevalence of behavioral risk factors among adolescents in the schools of Chandigarh and to find out the association of socio-economic status with behavioral risk factors among adolescents in the schools of Chandigarh.

METHODS

Chandigarh city is a center for education, work opportunities, and tourism in northern India. It is a relatively young city which was built about 50 years ago. Beside the city, union territory has a rural area having 13 villages.[7] A cross sectional study was carried out in Chandigarh by enrolling students from V to XII class in the age group of 10 to 19 years. Multi-stage random sampling was done. A sample size of 250 students was estimated for the survey by considering the prevalence of risk factor (e.g. smoking) to be 15%, absolute precision of 5%, and a power of 80%.[8] In first stage, 183 schools of Chandigarh Union Territory were divided into two geographical clusters, i.e., urban (148 schools) and rural (35 schools). At the second stage, these clusters were further divided into two sub-clusters, i.e., private and government schools. One school from each sub-cluster was selected randomly. From each sampled school, 63 students from class VI to XII, i.e., 9 students from each class having average class size of 40 were selected randomly. Twenty two students did not participate because of their lack of interest or their parents did not grant permission for their participation. Three students returned un-filled questionnaires. So the numbers of students who finally participated in the study were 226 (90%).

Students below 10 years and above 19 years of age were excluded. The students whose parents and students themselves refused to participate were also excluded.

A self-administered structured questionnaire was developed based on previously used questionnaires.[9,10] Most of the questions were taken from these questionnaires and a few were developed locally. The questionnaire was pretested before use. It had ten sections. The first section included general information and socio-demographics. Second section had questions related to the weight and height measurement. The third section was on diet such as frequency of fruits and vegetable intake etc. In this section, questions like "How many times did you have meals prepared outside home during last 7 days? "What do you have during short breaks in school if you feel hungry? "If you have food items from the stalls or school canteen, what do you prefer to have?" were developed locally and rest were from the standard questionnaires. Fourth section comprised of questions related to physical activity. And section fifth to seventh included questions related to tobacco use, alcohol consumption, and drug abuse respectively. Questions like "Do you know any person of your age in your school who smokes or use any other tobacco product like gutka, paan, alcohol, or drugs?" included in these sections were developed locally. The eighth section comprised of questions related to road safety, and questions related to violence and mental health including questions on suicidal ideation and attempts were placed in the ninth and tenth section respectively. Eleventh section had questions on sexual behavior. And the last section had questions regarding health education and health checkups in the school.

A day before data collection, interactive session was conducted for rapport building. These sessions included discussion about their life style likes or dislikes. Informed consent sheet, along with the information sheet regarding the education and occupation of their head of household and about their total family income, was sent to the parents through participants themselves to seek their permission for enrollment of the students in the study and to have information of their socio-economic status. On the second visit, detail information regarding the study procedures was provided to the students.

After obtaining written informed consent of the parent and assent from the students, the questionnaires were administered to the selected students after ensuring privacy and confidentiality. No teacher was present in the room where the study was conducted. Students sat at adequate distance. The students were asked to respond by marking circle on the options of the questions. Any form of self-writing was avoided in the questionnaire to maintain confidentiality. It took one to one and half hour to fill a form. The filled questionnaires were dropped in a sealed box by the students to maintain the confidentiality. After collection of completed questionnaires, again counseling session was conducted to answer queries of students. For pre- and post- counseling sessions, half an hour and one hour was devoted respectively in each school.

The analysis was done using Epi Info 7 software. Socioeconomic status (SES) was computed by adding scores of education and occupation of head of the family and total family income according to Kuppuswamy scale.[12]

The response rate for various questions varied from 100% to 82.7% since students were free for not answering any part of the questionnaire. As the response rate was different for various sections of the questionnaire, hence, the denominator number differs in responses to various questions. Prevalence of various behaviors was calculated per 100 students. Chi square test was used to statistically significant differences in behaviors according to socio-demographic characteristics.

RESULTS

Forty seven percent of the participants were girls and 53% were boys. Mean age was 14 years (±2). Majority (70%) of the students were in the age group of 10-14 years. Most of them belonged to villages followed by urban area and slums. In one third, the head of family was unskilled worker, and 30% were in clerical jobs. Ten percent of the head of households were illiterate. Eight percent had total family income below Rs.1600 (USD 24) per month. Table 1 shows the socio-demographic profile of study participants.

In this study, 187 (82.7%) participants reported their weight and height, almost one third (31%) of the students was undernourished, 7% overweight, and no one was found to be obese. The nutritional status was similar in different genders, age groups, and socioeconomic classes. Among those who perceived themselves to be under-weight, 22% were trying to lose weight and 49% were trying to gain weight (Table 2). Out of overweight students, 18% were trying to gain weight (Table 3). More (30%) girls were trying to lose weight than the boys (20%) (p=0.02). There was no statistical difference about perception of body weight among gender, age groups, and SES classes.

Table 1: Socio-demographic profile of study participants (n=225).

Variable	Number	Percentage (%)
Age group (in years) (n=225)		
10-14	158	70
15-19	67	30
Gender (n=225)		
Boys	119	53
Girls	106	47
Residence (n=212)		
Rural	83	39
Urban	69	33
Slum	60	28
Socio-economic status (n=205)		
Upper	57	28
Lower	148	72

Table 2: Nutritional status by students' perception about their body weight.

Nutrition status (according to body mass index)	Perception about body weight			Total N (%)
	Under-weight N (%)	Right-weight N (%)	Over-weight N (%)	
Under-nourished	25 (43)	22 (38)	11 (19)	58 (100)
Normal	36 (34)	53 (49)	18 (17)	107 (100)
Over-weight	5 (38)	7 (54)	1 (8)	13 (100)

Table 3: Perception about body weight according to the efforts being made to change their body weight.

Perception about body weight	Trying to change body weight				Total
	Lose weight	Gain weight	Have same weight	Not trying to change weight	
	N (%)	N (%)	N (%)	N (%)	N (%)
Under-weight	17 (22)	37 (49)	10 (13)	12 (16)	76 (100)
Right-weight	18 (19)	19 (19)	35 (36)	25 (26)	97 (100)
Over-weight	16 (49)	6 (18)	5 (15)	6 (18)	33 (100)
Total	51 (25)	62 (30)	50 (24)	43 (21)	206 (100)

Questions about the breakfast in the last one week and fruit and vegetable intake in the last one month were asked. Daily skipping of breakfast was found to be prevalent in 8%, and only 50% eat breakfast daily. Eighteen percent students were taking meals that were prepared outside home more than 3 times a week. Most of the students (71%) eat food brought from home followed by food consumed from school canteen (27%). Students preferred to have samosa/patty and cold drinks at canteen. Around 6% students (95% CI 3.5-10.5%) did not eat fruit and vegetables during last one month. More than half of the students eat fruits less than the recommended servings. Similarly, more than one third (39%) consumed vegetables less than recommended. 3 servings per day during past one month (Table 4). Vegetable intake of more than 3 times a day was more among girls (59%) than boys (53%) (p=0.03).

Only 23% of the students (95% CI 17.2-28.7%) were physical active as per the recommendations, i.e., at least one hour per day for 5 or more days in a week. Similarly, the time spent in sitting activities of more than 2 hours per day was prevalent in 33%. Upper class students were more physically active (43%) than lower class (17%) (p<0.001).

Table 4: Eating habits of participants.

Variable (n=226)	Number	Percentage (%)
Breakfast in past 1 week		
0 day	17	8
1-2 days	28	12
3-6 days	67	30
7 days	114	50
Fruit intake per day in past 1month		
0 times	13	6
1-3 time	120	53
>3 times	93	41
Vegetable intake per day in past 1 month		
0 times	10	5
1-3 times	88	39
>3 times	128	56

A total of 224 (99%) students responded to the questions related to smoking. Overall smoking prevalence was 7% (Table 5). Smoking was more prevalent in boys (12%) than girls (3%) (p=0.002). Tobacco use was more prevalent among lower socio-economic status (SES) class students (9%) than upper class (6%) but the difference was not statistically significant (p=0.5). More than one third of the students (36%) who smoked had tried to quit smoking.

The respond rate was 97% for the questions related to alcohol. The alcohol consumption was found to be 3% (95% CI 1.05-6.09%). The prevalence was statistically not different between genders i.e. 2% in girls and 4% in boys. Around 4% students were consuming drugs (95% CI 2.09-7.1%). Alcohol consumption (6%) and drug abuse (7%) was more prevalent in upper socio-economic class adolescents (p<0.05). In response to question whether you know any student who has substance abuse in your school, 28% students revealed that they know one or more students of their age in their school who smoked tobacco or used tobacco products, 20% and 17% revealed that they knew someone who consumed alcohol or used illicit drugs respectively.

Table 5: Substance abuse pattern.

	Number	Percentage (%)
Current smokers (n=224)	14	7
Age for trying smoking first time*(n=28)		
≤9 years	8	29
10-13 years	13	46
≥14 years	7	25
Alcohol consumption (n=219)		
Yes	6	3
Age of first drink of alcohol (n=16)**		
≤9 years	5	31
10-13 years	5	31
≥14 years	6	38
Drug users (n=222)		
Yes	9	4

*includes past tobacco users, *includes past 10 alcohol consumers

Out of 226, 212 (93%) students responded to the questions related to road safety, 125 students were driving two-wheeler like motor-cycle, scooter etc. Out of these 125 students, only 31% reported 'always' wear helmet and 34% 'never' wear helmet while driving. Helmet wearing is more prevalent in older students (15-19 years) than their younger counterparts (p=0.001). Among those who rode a car, about 50% always wore seat belt but around 16% never wore seat belt. More than one third (36%) students revealed the use of mobile phones while driving for texting, calling or emailing for than 2 days in last one month. Around 47% of the students were involved in a physical fight on one or more than one occasion in past 30 days. Out of those who were involved in physical fight, 5% were treated by doctor or nurse more than one time. Boys (52%) were more involved in physical fight than girls (39%). Around 11% students missed school because of the fear of physical abuse (Table 6).

Out of 226, 210 responded to questions on psychosocial aspects. Around 20% (95% CI 14.8-25.9%) reported of feeling 'sad or hopeless' during past one month, with no statistically significant difference among age groups, gender and SES classes. Around 9% (95%CI 5.8-14.2%) of the students had 'thought about killing themselves'. Out of those who felt hopeless (n=43), more students had thought about killing themselves as compared to those who did not feel hopeless (p<0.001). Response rate to the sexual behavior section was less as compared to other

behaviors. More than one third (35%) students did not respond to these questions. Most (88%) of the students in the early age group (11-14 years) did not respond to these questions; perhaps they did not understand the questions related to sexual intercourse and contraceptives etc. The involvement in the activities like hugging was 23% and kissing was 11%. Older students were more involved in sexual intercourse (8%) than the younger students (6%) ($p<0.05$).

Table 6: Injury, safety, and violence.

	Number	Percentage (%)
Wearing helmet while riding two-wheeler* (n=125)		
Never/ rarely	61	49
Sometimes	20	16
Mostly/ Always	44	35
Wearing seat belt while in car (n=212)		
Never/ rarely	73	35
Sometimes	22	10
Mostly/ always	117	55
Being in physical fight (n=221)		
0 times	118	53
1 times	52	24
>1 times	51	23

*Out of the total respondents, those who drive two wheeler (n=125)

For questions related to health education and checkups in schools, 217 (96%) students responded. Around 56% students reported that lectures on health topics were delivered in their school, and 64% students reported that regular health check-ups were conducted in their school.

DISCUSSION

It was encouraging to find that most of the parents allowed their children's participation in behavior survey which included sensitive questions on sexuality and substance use. Most of the students participated in the survey, and could understand the questions. Their responses to various questions ranged from 93% to 100%. However, most of the students in early adolescence (11 to 14 years) could not comprehend questions related to sexuality and contraception, indicating the need for sex education in the schools.

The overall prevalence of overweight was 7%, which is similar to 9% overweight documented by Shashidhar et al (2010) and some other studies.[13-15] Skipping breakfast was found to be 8% and those who eat breakfast daily were only 50% which is similar to the study by Arora et al (2012).[16] Breakfast intake every-day is considered to be very necessary. Those individuals who miss breakfast during childhood and adulthood can have effects on cardio-metabolic health which includes larger waist circumference, and higher fasting insulin.[17] The frequency of vegetable and fruit intake were comparable to those reported by Peltzer et al (2012).[18] According to de Rezende et al (2014), only 29% adolescents reached the recommended physical activity level.[19] Similarly, in our study also physical activity level were low.

Overall smoking prevalence was 7% which is similar to other reports Mohanan et al (2014) documented that the prevalence of tobacco is more among boys than girls.[20] Similar trends were found in the present study. The median of the age of initiation of tobacco consumption was comparable to other studies i.e., between 10-13years.[21,22] More than one third of the adolescents (36%) who smoked had tried to quit smoking which is comparable to study by Subba et al (2011).[23] The prevalence of alcohol consumption was also found to be similar another study but the prevalence was statistical not different by gender in the present study.[20] This might be due to increasing trends of alcohol consumption in females.[24,25] In the present study, alcohol consumption and drug abuse was more prevalent in upper socio-economic class. Similar findings were reported by Humensky and Hanson.[26,27] May be more money required for buying drugs is available to them.

Regarding road safety, the findings of present study were similar to the study by Sharma et al (2007) which documented that while riding two-wheeler, 34% students never wear helmet and 72% students 'not always' wear helmet including 23% who mentioned 'never' wearing a helmet.[28] And 52% students reported 'not always' wearing seat belt while riding in car. In this study, more than one third (36%) students revealed the use of mobile phones for texting, calling or emailing for than 2 days in last one month. Mobile phone use is a cause of distraction while driving.[29]

A study by Samanta et al (2012) had revealed that 40% students were in physical fight which was comparable to our study.[30] The students who had suicidal ideation was 9% which is comparable to study by Sidhartha and Jena (2006) but slightly higher than the study by Priti et al (2009) in Chandigarh which shows the suicidal ideation of 6%.[31,32]

Most of students in early adolescence perhaps did not understand the questions related to sexual behavior as only 12% responded to these questions. It indicates that studies related to sexual behavior are not feasible in this age group. The results of the involvement in sexual activities, i.e., hugging and kissing were similar to study conducted by Lakshmi et al (2007) in Chandigarh few years ago.[33] There was no significant difference in having sexual intercourse among age, gender and SES groups.

Major strength of the study was the use of a standard questionnaire which was prepared by selecting standard questions from other studies such as Global School Health Survey and Youth Risk Behavior Surveillance System. Complete privacy and confidentiality was ensured during data collection to reduce the social

desirability bias. And it is a comprehensive study which included most of the relevant behavioral risk factors as compared to other studies.

CONCLUSION

Rapid surveys for monitoring important behavioral risk factors including sensitive issues on substance abuse and sexual practices can be conducted in schools with parents consent. Many risk factors were found to be prevalent among school students which can adversely affect their future health. Among most of the students, diet and physical activity behaviors were not as per the recommendations. Hence, students should be educated regarding the healthy diets and lifestyle.

Recommendations

Rapid survey method employed in this study can be used to conduct surveillance in the schools at regular intervals to save time and cost. There should be regular health educations classes or counseling sessions involving parents and teachers along with the health checkups as many behavioral risk factors lead to NCDs.

Limitation

This study also has some limitations like only school students were included in the study, hence, generalizability of the study could be limited, though school enrollment rates are quite high in Chandigarh. The sample size was also not large enough to test statistical significance of associations of socio-demographic characteristics with some of the behaviors which had low prevalence.

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