

Original Research Article

Socio-demographic correlates of awareness of diabetes and hypertension among teenage students in Sunder Nagar District Mandi, Himachal Pradesh, India

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ABSTRACT

Background: Adolescents are forming long-term health habits throughout this time. Prevention of non-communicable diseases (NCDs) requires early awareness, especially of diabetes and hypertension. Objective was to assess awareness of teenager students regarding risk factors of diabetes and hypertension. To investigate socio-demographic characteristics of students that influence awareness patterns.

Methods: A descriptive cross-sectional survey was conducted in Sunder Nagar, Himachal Pradesh during January 2025 to June 2025. Total 182 school going teenagers aged 14-19 years were included as selected by stratified random sampling. A semi-structured questionnaire was used to collect data on socio-demographic factors, diabetes and hypertension awareness, and health-related information sources. Descriptive statistics and Chi-square tests were used for analysis in SPSS version 26.0.

Results: Majority of respondents (95.6%) had some understanding of hypertension, whereas awareness of diabetes was lower, with 79.7% having minimal knowledge and 4.9% having none. No significant gender differences in awareness levels were found ($p>0.05$). Age was significantly associated with hypertension awareness ($p=0.031$). Family and friends (34.6%) were the most frequent sources of health information, followed by healthcare professionals (28.6%) and schools (22.0%).

Conclusions: The study identifies significant gaps in awareness among teenagers for diabetes and hypertension irrespective of their socio-demographic characteristics. It emphasizes the importance of structured, school-based health education programs to increase knowledge and promote healthy behaviours of young adolescent students. It will be helpful in minimizing India's future burden of NCDs.

Keywords: Adolescents, Diabetes, Hypertension, Awareness, Non-communicable diseases (NCD), Health education

INTRODUCTION

Adolescence, defined as the period between the ages of 10 and 19, is an important time for developing good habits that will influence the risk of disease later in life. Globally, there are about 1.2 billion adolescents aged 10–19 years, and in India, they constitute nearly one-fifth of the population.¹ This age group is critical for early identification of knowledge gaps and behavioural patterns

that may influence long-term health outcomes. In India alone, over 253 million adolescents roughly 21% of the total population are in this age bracket.² NCDs, especially diabetes and hypertension, are major global health issues. Diabetes and hypertension were responsible for an estimated 218 million and 76 million disability-adjusted life years (DALYs) in 2019. These disorders not only complicate therapy but also provide a significant risk for chronic illnesses such as cardiovascular and respiratory

ailments.³ Alarming, these illnesses are affecting younger populations, including adolescents and people of working age, increasing the risk of premature death. Hypertension can appear in childhood, and early onset is significantly connected with an elevated risk of developing cardiovascular disease and type 2 diabetes in age.⁴

Unhealthy adolescent activities, such as smoking, drinking, and using illegal drugs, increase the risk of diabetes and hypertension while also contributing to other physical and mental health issues.⁵ The Global Youth Tobacco Survey (GYTS) 2019 found that roughly 14.6% of Indian adolescents aged 13 to 15 use tobacco products. Because adolescent diabetes and hypertension frequently continue into adulthood, early intervention with pharmacological medication or lifestyle adjustment is critical to reducing future disease burden.

School-based treatments aimed at raising NCD awareness and improving lifestyle choices are very crucial, particularly in rural regions where health education gaps are more severe.⁶ In our recent published article in the same target population presenting health impacting behaviour of adolescents as part of the study, key barriers to healthy practices included lack of knowledge (35.2%), limited access to healthy food (29.7%), and lack of time (28.0%).

No significant gender differences were found in knowledge of health-impacting behaviours ($p=0.224$). Our recent research article reported that awareness and practices regarding hypertension and diabetes remained unsatisfactory, emphasizing the need for structured, school-based health education and professional involvement to promote long-term healthy behaviours.⁷ Present paper is concerned with awareness of diabetes and hypertension and to investigate socio-demographic factors influencing awareness pattern for the purpose of designing future health interventions with following specific objectives:

Objectives

To assess awareness of teenager students regarding risk factors of diabetes and hypertension. To investigate socio-demographic characteristics of students that influence awareness patterns.

METHODS

This descriptive cross-sectional study was conducted between January 2025 and June 2025 in Sunder Nagar, District Mandi, Himachal Pradesh, among 182 adolescent students aged 14–19 years. Schools were selected using a convenient sampling approach, and within these schools, participants studying in classes 9th to 12th were recruited through stratified random sampling with proportional allocation to ensure representativeness across grades.

Data were collected using an interviewer-administered, semi-structured questionnaire that captured socio-demographic and economic characteristics, knowledge related to hypertension and diabetes, and health-impacting practices. To maintain ethical standards, informed consent was obtained from all respondents, interviews were conducted in privacy, and confidentiality was strictly preserved. The collected data were analysed using SPSS version 26.0, where descriptive statistics were applied to summarize quantitative variables, and the Chi-square test was employed to assess associations between gender and life-impacting factors.

RESULTS

This study explored adolescents' awareness pattern of diabetes and hypertension and risk factors. The results indicate that while most participants had some level of awareness, significant gaps remain, particularly in understanding diabetes. Among the 182 participants, the majority ($n=145$, 79.7%) reported limited knowledge about diabetes, with slightly more females ($n=99$, 81.1%) than males ($n=46$, 76.7%) as shown in Table 1. About ($n=28$, 15.4%) had only heard of diabetes but did not know what it is, while a small portion ($n=9$, 4.9%) had no awareness at all. Out of 182 participants, ($n=174$, 95.6%) reported having some knowledge about hypertension, while ($n=8$, 4.4%) had no knowledge. Among males ($n=60$), ($n=55$, 91.7%) had some knowledge and ($n=5$, 8.3%) had none. In comparison, ($n=119$, 97.5%) of females reported some knowledge, with only ($n=3$, 2.5%) lacking it. However, the association between knowledge of hypertension with gender was not significant ($p=0.69$). The data shows that family and friends are the primary source of health information for 34.6% of adolescents, followed by healthcare professionals (28.6%) and schools (22.0%).

Table 1: Respondents awareness pattern of diabetes hypertension with gender.

Awareness	Male (N %)	Female (N %)	Total
Knowledge of diabetes			
Yes, but I have limited knowledge	46 (76.7)	99 (81.1)	145 (79.7)
I have heard of it, but I don't know what it is	9 (15.0)	19 (15.6)	28 (15.4)
No awareness	5(8.3)	4 (3.3)	9 (4.9)
Knowledge of hypertension			

Continued.

Awareness	Male (N %)	Female (N %)	Total
No knowledge	5 (8.3)	3 (2.5)	8 (4.4)
Have some knowledge	55 (91.7)	119 (97.5)	174 (95.6)
Awareness category			
Very low	10 (16.7)	25 (20.5)	35 (19.2)
Low	15 (25.0)	37 (30.3)	52 (28.6)
Adequate	35 (58.3)	60 (49.2)	95 (52.2)
Total	60 (100.0)	122 (100.0)	182 (100.0)

Table 2: Distribution of knowledge of the main source of health information among respondents.

Main source of health information	Frequency (N)	N%
School	40	22.0
Family and friends	63	34.6
Social media	27	14.8
Healthcare professionals	52	28.6
Total	182	100.0

Table 3: Gender wise distribution of respondents' knowledge about risk factors of diabetes and hypertension.

Awareness	Male (N%)	Female (N%)	Total
Family history of diabetes is a risk factor	12 (20.0)	41 (33.6)	53 (29.1)
		$\chi^2=3.60$	P=0.16
Normal level of blood sugar	16 (26.7)	44 (36.1)	60 (33.0)
		$\chi^2=1.60$	P=0.20
Diabetes can't be prevented	7 (11.7)	7 (5.7)	14 (7.7)
		$\chi^2=3.36$	P=0.33
Have some knowledge	57 (95.0)	105 (88.1)	162 (89.0)
		$\chi^2=3.3$	P=0.70
Some knowledge about hypertension	55 (91.7)	119 (97.5)	174 (95.6)
		$\chi^2=3.30$	P=0.69
Knowledge on high salt intake and hypertension	33 (55.0)	85 (69.7)	118 (64.8)
		$\chi^2=3.97$	P=0.13
Stress contributing to hypertension	51 (85.0)	108 (88.5)	159 (87.4)
		$\chi^2=3.51$	P=0.77
Normal blood pressure level	30 (50.0)	69 (56.6)	99 (54.4)
		$\chi^2=3.70$	P=0.40
No interest in joining a program	10 (16.7)	17 (13.9)	27 (14.8)
		$\chi^2=3.35$	P=0.34
Total	60	122	182

Table 4: Awareness scores of respondents about risk factors of diabetes and hypertension by gender.

Awareness scores of the disease		N	Mean	Standard deviation	95% confidence interval	
					Lower bound	Upper bound
Diabetes awareness score	Male	60	3.0833	0.94406	2.8395	3.3272
	Female	122	2.8197	1.14283	2.6148	3.0245
	Total	182	2.9066	1.08585	2.7478	3.0654
Hypertension awareness score	Male	60	2.5333	1.15666	2.2345	2.8321
	Female	122	2.4918	1.12261	2.2906	2.6930
	Total	182	2.5055	1.13092	2.3401	2.6709
Overall awareness score	Male	60	5.6167	1.82350	5.1456	6.0877
	Female	122	5.3115	1.94164	4.9635	5.6595
	Total	182	5.4121	1.90390	5.1336	5.6906

Table 5: Awareness scores of respondents about risk factors of diabetes and hypertension by age.

Awareness scores of the disease	Age	N	Mean	Standard deviation	95% confidence interval	
					Lower bound	Upper bound
Diabetes awareness score	14	49	2.8367	1.12448	2.5137	3.1597
	15	46	2.6087	1.02151	2.3053	2.9120
	16	43	2.9302	1.14216	2.5787	3.2817
	17	37	3.2973	0.99624	2.9651	3.6295
	18	6	3.0000	0.89443	2.0614	3.9386
	19	1	4.0000	.	.	.
	Total	182	2.9066	1.08585	2.7478	3.0654
Hypertension awareness score	14	49	2.1224	1.25221	1.7628	2.4821
	15	46	2.4565	1.02646	2.1517	2.7613
	16	43	2.7907	1.08140	2.4579	3.1235
	17	37	2.6216	1.06331	2.2671	2.9761
	18	6	3.0000	0.89443	2.0614	3.9386
	19	1	4.0000	.	.	.
	Total	182	2.5055	1.13092	2.3401	2.6709
Overall awareness score	14	49	4.9592	2.10118	4.3557	5.5627
	15	46	5.0652	1.71791	4.5551	5.5754
	16	43	5.7209	1.89392	5.1381	6.3038
	17	37	5.9189	1.81626	5.3133	6.5245
	18	6	6.0000	0.89443	5.0614	6.9386
	19	1	8.0000	.	.	.
	Total	182	5.4121	1.90390	5.1336	5.6906

Table 6: Awareness scores of respondents about risk factors of diabetes and hypertension by family income.

		N	Mean	Standard deviation	95% confidence interval	
					Lower bound	Upper bound
Diabetes awareness score	Lower	36	2.6667	1.17108	2.2704	3.0629
	Lower middle	43	3.0698	1.09968	2.7313	3.4082
	Upper middle	64	2.8438	0.99553	2.5951	3.0924
	High	39	3.0513	1.12270	2.6873	3.4152
	Total	182	2.9066	1.08585	2.7478	3.0654
Hypertension awareness score	Lower	36	2.2500	1.25071	1.8268	2.6732
	Lower middle	43	2.3256	1.14893	1.9720	2.6792
	Upper middle	64	2.5313	1.09789	2.2570	2.8055
	High	39	2.8974	0.96777	2.5837	3.2111
	Total	182	2.5055	1.13092	2.3401	2.6709
Awareness score	Lower	36	4.9167	2.14310	4.1915	5.6418
	Lower middle	43	5.3953	2.00166	4.7793	6.0114
	Upper middle	64	5.3750	1.76833	4.9333	5.8167
	High	39	5.9487	1.70060	5.3974	6.5000
	Total	182	5.4121	1.90390	5.1336	5.6906

Social media was the least cited source at 14.8%. These findings suggest that while informal networks play a major role in health education, enhancing school-based and professional health communication can improve the accuracy and reliability of information adolescents receive. Results show that 58.3% of males and 49.2% of females had adequate awareness. Low awareness was reported by 25.0% of males and 30.3% of females, while very low awareness was seen in 16.7% of males and

20.5% of females. Overall, more than half of the participants had adequate awareness, with males slightly outperforming females across all categories. However, the association between gender and awareness category was not statistically significant ($p=0.50$).

Results presented in Table 2 indicate that family and friends are the primary source of health information for 34.6% of adolescents, followed by healthcare

professionals (28.6%) and schools (22.0%). Social media was the least cited source at 14.8%. These findings suggest that while informal networks play a major role in health education, enhancing school-based and professional health communication can improve the accuracy and reliability of information adolescents receive.

Among the 182 adolescent participants, 20.9% identified being overweight and physical inactivity as risk factors

for diabetes as shown in Table 3. A family history of diabetes was reported by 53 participants (29.1%), while 105 (57.7%) reported none and 24 (13.2%) were uncertain. Gender differences in reporting family history were not statistically significant ($p=0.16$). Awareness of normal blood sugar levels was low, with only 60 participants (33.0%) answering correctly; females (36.1%) showed slightly higher awareness than males (26.7%), though the difference was not significant ($p=0.20$).

Table 7: Awareness scores of respondents about risk factors of diabetes and hypertension by family history of diabetes.

					95% confidence interval	
		N	Mean	Standard deviation	Lower bound	Upper bound
Diabetes awareness score	Yes	53	2.7736	0.95357	2.5107	3.0364
	No	105	3.0000	1.15192	2.7771	3.2229
	Not sure	24	2.7917	1.06237	2.3431	3.2403
	Total	182	2.9066	1.08585	2.7478	3.0654
Hypertension awareness score	Yes	53	2.4151	1.09954	2.1120	2.7182
	No	105	2.5810	1.10750	2.3666	2.7953
	Not sure	24	2.3750	1.31256	1.8208	2.9292
	Total	182	2.5055	1.13092	2.3401	2.6709
Awareness score	Yes	53	5.1887	1.61789	4.7427	5.6346
	No	105	5.5810	1.98930	5.1960	5.9659
	Not sure	24	5.1667	2.09900	4.2803	6.0530
	Total	182	5.4121	1.90390	5.1336	5.6906

Regarding diabetes prevention, 130 participants (71.4%) believed it could be prevented through healthy eating and physical activity, 18 (9.9%) thought it could only be prevented to some extent, and 14 (7.7%) believed it could not be prevented. Gender differences were not significant ($p=0.339$). Overall, 162 respondents (89.0%) reported some knowledge of diabetes, while 20 (11.0%) had none, with knowledge levels higher among males (95.0%) than females (88.1%), although this difference was not statistically significant ($p=0.70$).

Knowledge of hypertension was more prevalent, with 174 participants (95.6%) reporting some awareness, and only 8 (4.4%) reporting none. Among males, 91.7% had some knowledge compared to 97.5% of females, but this difference was not significant ($p=0.69$). Similarly, understanding of hypertension was not associated with gender ($p=0.28$). In terms of specific risk factors, 118 participants (64.8%) recognized high salt consumption as a contributor to hypertension, with greater awareness among females (69.7%) than males (55.0%); however, the association was not statistically significant ($p=0.13$).

A large majority (87.4%, $n=159$) identified stress as a contributor to hypertension, with slightly higher recognition among females (88.5%) than males (85.0%), though not statistically significant ($p=0.77$). Awareness of

normal blood pressure levels was reported by 99 participants (54.4%), with marginally higher awareness among females (56.6%) compared to males (50.0%); this difference was not significant ($p=0.40$). Regarding interest in participating in health programs was expressed by 38.5% of adolescents if programs were interesting, 28.0% were definitely interested, 18.7% were unsure, and 14.8% were not interested.

Definite interest was higher among females (32.0%) than males (20.0%), but the association with gender was not significant ($p=0.34$). The comparison of awareness scores between genders showed minor differences. Males had a slightly higher mean score for diabetes awareness (3.08) than females (2.82), indicating better awareness among males. For hypertension, both genders had nearly equal scores (males: 2.53; females: 2.49). Overall, males had a slightly higher combined awareness score (5.62) than females (5.31), suggesting similar levels of knowledge across genders. There was no statistically significant difference in diabetes awareness based on gender ($p=0.12$). Similarly, no significant gender-based differences were observed in hypertension awareness ($p=0.81$), and the overall awareness score also did not vary significantly with gender ($p=0.31$) as presented in Table 4.

Table 5 presents awareness scores for diabetes, hypertension, and overall awareness across different age groups. Seventeen-year-olds demonstrated the highest mean score for diabetes awareness (3.30) and also scored well on overall awareness (5.92). Hypertension awareness was lowest among 14-year-olds (2.12) and showed a gradual increase with age. Overall, younger adolescents aged 14–15 years had lower awareness scores, while older adolescents aged 16–18 years exhibited better awareness across all domains. There was no statistically significant difference in diabetes awareness across age groups ($p=0.08$). However, a significant age-based difference was observed in hypertension awareness ($p=0.031$), while the overall awareness score did not differ significantly with age ($p=0.06$).

Table 6 compares awareness scores for diabetes, hypertension, and overall awareness across different family income groups. Overall awareness followed the same pattern, with the highest mean score of 5.95 in the highest income group and the lowest score of 4.92 in the lowest income group. There was no statistically significant difference in diabetes awareness across income groups ($p=0.305$). Although the difference in hypertension awareness was not statistically significant ($p=0.053$). Similarly, the overall awareness score did not vary significantly across income groups ($p=0.134$).

Table 7 compares awareness levels based on participants' knowledge of a family history of diabetes. For diabetes awareness, those without a family history had slightly higher mean scores (3.00) compared to those who reported a family history (2.77) or were unsure (2.79). A similar pattern was observed in hypertension awareness, where participants with no family history scored higher (2.58) than those who answered “yes” (2.42) or “not sure” (2.38). Overall awareness was also highest among participants without a known family history (5.58), while those with a family history (5.19) or uncertainty (5.17) had slightly lower scores. There was no statistically significant difference in diabetes awareness based on family history ($p=0.401$). Similarly, no significant difference was observed in hypertension awareness ($p=0.572$), and the overall awareness score also did not vary significantly with family history ($p=0.378$).

DISCUSSION

This study examined adolescent awareness of diabetes and hypertension in Sunder Nagar, Himachal Pradesh, India. Gaps in awareness were found notably in terms of diabetes and related risks across socio-demographic groups, w. Awareness of hypertension was higher, presumably due to increased public exposure, but only one-third of adolescents could identify normal blood sugar levels. Family and friends were the primary information sources, with little dependence on schools, healthcare professionals, or social media, highlighting the need for improved official health education channels.

Older teenagers demonstrated slightly higher awareness. The moderate willingness to participate in interactive health programs demonstrates the possibility for youth-friendly, school- and community-based interventions involving health care providers. Despite its limited geographic scope and cross-sectional methodology, the study emphasizes the relevance of early, structured health education, community involvement, and digital platforms in raising teenage awareness and lowering the future burden of diabetes and hypertension.

The study holds significant strength in its focus on school-going adolescents aged 14–19 years, a crucial developmental stage when lifelong health behaviors are shaped. By examining their awareness pattern concerning diabetes and hypertension, the findings are both timely and relevant. Furthermore, the participants' perspectives on joining health programs highlight an important opportunity to design youth-oriented preventive interventions.

However, the scope of the study was confined to only two non-communicable diseases—diabetes and hypertension—which narrows its applicability. In addition, as the study was restricted to students from schools in a single city of Himachal Pradesh, the results cannot be generalized to the wider population. A detailed evaluation of existing practices and the long-term impact of health interventions in the selected schools should be undertaken in future studies. More studies are needed to track behavioural changes over time and assess the effectiveness of school-based health interventions.

CONCLUSION

The study identifies significant gaps in awareness of diabetes and hypertension among adolescent students in Sunder Nagar, Himachal Pradesh irrespective of their socio-demographic characteristics. Although most respondents had heard of these illnesses, their knowledge of preventive, normal levels, and risk factors was limited. Family and friends emerged as the key sources of health knowledge, emphasizing the need for improved school and healthcare-based education.

It emphasises the importance of structured, school-based health education programs to increase knowledge and promote healthy behaviours of young adolescent students. It will be helpful in minimizing India's future burden of non-communicable diseases. While this study provides useful information, its scope is confined to a specific geographic location and two NCDs, highlighting the necessity for bigger, multi-centric longitudinal studies.

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