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Original Research Article

Bridging gaps in awareness of cancer associated lifestyle factors in adolescents and young adults: an interventional study in Chandigarh

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ABSTRACT

Background: Cancer is a major public health concern and its incidence is growing worldwide. Adolescent and young adult (AYA) age group is a bridge between paediatric and adult age groups. AYAs have unique lifestyle patterns that may contribute to cancer risk. The study sought to assess the awareness and educate AYAs of Panjab University, Chandigarh about cancer risk associated lifestyle factors.
Methods: This cross-sectional Interventional study was conducted from March -June 2023. A predesigned, pretested, validated questionnaire was used for data collection. Descriptive and analytical analysis was performed using SPSS, analytical analysis was conducted using Chi square test to find the relationship between different lifestyle factors and demographic characteristics such as age and gender.
Results: The study included a total of 360 participants, consisting of 170 (47.2%) males and 190 (52.8%) females, aged between 15 and 39 years, of Panjab University, Chandigarh. Among them, 92.5% had awareness of smoking as risk factor for cancer. However, lower levels of awareness regarding lifestyle behaviours associated with cancer risk, including inadequate consumption of fruits and vegetables, regular intake of sweets and sugary drinks, following a high-fat diet (28.3%); insufficient physical activity (38.3%) and obesity (36.1%).
Conclusions: The current study indicated a disparity in knowledge levels among adolescents and young adults (AYAs) of Panjab University. It is crucial to address the gaps in knowledge and promote healthy behaviours related to cancer prevention through targeted education campaigns among adolescents and young adults.

Keywords: Adolescents, Awareness, Cancer, Lifestyle behaviour, Prevention, Young adults

INTRODUCTION

Cancer is a significant category of non-communicable diseases that poses a worldwide health challenge, impacting people of all age groups. Despite international efforts to alleviate the burden of cancer, a high-level meeting on non-communicable diseases held by the United Nations revealed insufficient advancement towards the achievement of Target 3.4 outlined in their Sustainable Development Goal.[1] Cancer remains the leading cause of death in many nations of the world and is associated with an increase in global incidence.[2] National Cancer Institute defined Cancer in adolescents and young adults (AYAs) as diagnosis taking place amongst age group 15 to 39 years.[3]

According to the World Health Organization (WHO), about one third of cancer are caused by lifestyle habits, such as smoking, poor physical activity, diet, alcohol abuse and obesity etc.[4] Globally, in 2019, an estimated 1.3 million new cancer cases and 397583 cancer-related deaths occurred among AYAs.[5] In India, according to the ICMR study based on PBCR data, there will be 1,78,617 incidences of cancer among adolescents and young adults of both sexes by 2025 with cancer rates were found to be

greater among females than males in the age group of 15 to 39.[6]

In terms of cancer risk, adolescents and young adults (AYAs) are a unique group of people because they are in a transitional stage of life where lifestyle habits and behaviours are still forming. Providing comprehensive cancer education regarding the causes of cancer among AYAs and primary preventive strategies such as risk reduction approach can significantly lower the risk of cancer development in later life and improve overall health outcomes.[7-8] There is a need to convert adolescent knowledge related to lifestyle factors into behavioural change.

In the realm of academic literature, there is a limited body of research within the Indian context that has explored the dietary and health behaviours of university students in the adolescent and young adult (AYA) demographic. This study was conceptualised to assess the gap in awareness of cancer associated life style factors in AYAs and bridge the same by educating them.

METHODS

This cross-sectional Interventional study was conducted among the students of Panjab University, Chandigarh (North India). An online video-based educational intervention was conducted with the aim of addressing participants' concerns and enhancing their understanding of the link between lifestyle factors and cancer risk. The intervention aimed to provide clarifications and updates on relevant knowledge, specifically related to the association of lifestyle choices with cancer risk. However, due to limitations in time and resources, no follow-up was conducted during the course of the study. The study was conducted from March 2023-June 2023. Sample Size was calculated by using the following formula with approximation for large population:

$$N = Z^2*(P)*(1-P)/(L)^2$$

Where**,** Z = Z value of standard normal variate, P = Prevalence percentage and L = Standard Error. On the basis of 95% confidence coefficient with 35% prevalence and 5% standard error, the sample size comes out to be 349, but taking into account non response rate as 10%, 400 students were interviewed. For this study, 360 students were considered as sample. The study was conducted among adolescents and young adults of Punjab University within age range of 15-39 years. The departments were chosen by simple random technique. The desired sample from different departments were selected as per probability proportional to size (PPS) ensuring adequate representation. The students from chosen departments were selected by convenient sampling.

A predesigned, pretested, validated questionnaire was developed to determine the awareness about lifestyle associated cancer risk factors among students of Panjab University. This tool was designed by using WHO STEPS Instrument and questionnaire from study by Gabriella Di Giuseppe on topic “Cancer Prevention: Knowledge, Attitudes and Lifestyle Cancer-Related Behaviours among Adolescents in Italy” (Permission was sought from the authors). Participants were informed about the study's objectives and methodologies via an Information sheet provided to them. ICMR 1997 ethical guidelines were adhered to rigorously. The study was approved by the Institutional Ethics Committee. Participants were asked for their informed consent before the study begins and their confidentiality was guaranteed.

Inclusion criteria

Adolescents and young adults who fall within age group of 15-39 years. Physical proof of the library card was utilized as a means of confirming the enrolment status were included.

Exclusion criteria

Participants having some mental disorders, suffering from any type of cancer, not willing to take part in the study or those who were not in the age group of 15-39 years were excluded.

Statistical analysis

Statistical Package for Social Sciences (SPSS) software, specifically version 29.0 was utilized for data entry, coding and descriptive and inferential analysis of the collected data. Descriptive analysis was performed using frequency distribution tables to summarize the key characteristics of the sample. Statistical methodology like Chi square test was utilized to find the relationship between different lifestyle factors and demographic characteristics such as Age and Gender.

RESULTS

The study involved 360 participants, with 47.2% males and 52.8% females, focused on university students aged between 15-39 years. Participants were categorized into age groups: 15-19 (25.6%), 20-24 (35.8%), 25-29 (20.3%), 30-34 (15.3%), and 35-39 (3.1%). Marital status indicated 20.3% were married, while 79.7% were unmarried. Family structures varied, with 66.1% belonging to nuclear families and 26.1% to joint families. Regarding education, 60.8% were pursuing graduate degrees and 39.2% were enrolled in post-graduate programs (Table 1).

The majority of participants (98.9%) showed high awareness of the term "cancer." Regarding risk factors, 96.4% recognized the link between smoking and cancer, while smaller proportions acknowledged low fruit/vegetable intake (15.3%), daily intake of sweets/sugary drinks (16.7%), high-fat diets and poor

physical activity (23.9%), and overweight/obesity (33.1%). Media platforms (69.7%) were the primary source of knowledge, followed by parents/relatives (25.3%), friends (22.2%), health camps/seminars (12.8%), and health staff (12.5%). Most participants (98.3%) considered cancer a serious disease, with 63.6% believed it as preventable.

Table 1: Socio-demographic distribution of AYAs (adolescents and young adults).

Variables	Frequency (n=360)	Percentage (%)
Age (years)		
15-19	92	25.6
20-24	129	35.8
25-29	73	20.3
30-34	55	15.3
35-39	11	3.1
Gender		
Male	170	47.2
Female	190	52.8
Marital status		
Married	73	20.3
Unmarried	287	79.7
Type of family		
Nuclear	238	66.1
Joint	94	26.1
Three generation	18	5.0
Staying alone	10	2.8
Education		
Graduation	219	60.8
Post graduation	141	39.2

Regarding lifestyle behaviours, only 10.3% of participants currently use tobacco, with 56.8% smoking daily. Most (73.0%) started smoking between ages 20-24, consuming fewer than five cigarettes/bidis daily. Over the past year, 43.2% tried quitting, with 21.6% received professional advice. Smokeless tobacco use was reported by 2.7%. The primary reasons cited for tobacco use were anxiety, teenage curiosity, and peer pressure. For diet, 15.0% and 41.9% consumed fruits and vegetables daily, with 37.2% and 69.7% had servings twice a day. High-fat food intake was reported by 28.6%, and snacks, sweets, and sugary drinks by 25.6%. In terms of physical activity, 11.9% and 38.6% engaged in vigorous and moderate-intensity activities, respectively. 57.8% spent over 5-6 hours sitting daily, but 43.3% took breaks every hour. Obesity-wise, 49.7% were overweight (BMI 23.0-24.9 kg/m²), and 41.4% had never attempted weight loss.

In the study, participants' awareness of lifestyle factors associated with later-life cancer risk was assessed. The results showed that most were aware of passive smoking (87.2%) and the negative effects of tobacco on the reproductive system (92.5%). A quarter recognized the risks of insufficient fruit/vegetable intake, daily sweets/sugary drinks, and high-fat diets (28.3%). Prolonged sitting was acknowledged as a risk by 38.3% of participants, and 36.1% were aware of the link between early-life obesity and later-life cancer risk (Table 2).

Table 2: Awareness of lifestyle factors associated cancer risk among AYAs.

Lifestyle factors related cancer risk in later life	Awareness N (%)
Passive smoking	314 (87.2)
Tobacco use with negative effects on reproductive system	333 (92.5)
Insufficient intake of fruits/vegetables, daily intake of sweets and/or sugary drinks, and high fat diets	102 (28.3)
Long-term sitting	138 (38.3)
Obesity at young age	130 (36.1)

The chi-square test assessed gender differences in awareness of cancer-related lifestyle factors. Both genders had similar awareness of passive smoking ($p>0.05$). However, females showed significantly higher awareness of tobacco's reproductive effects (96.80% vs. 87.60%, $p<0.05$). No significant gender differences were found in awareness of inadequate fruit/vegetable intake, daily sweets/sugary drinks, and high-fat diets ($p>0.05$). Females had significantly higher awareness of the risks of long-term sitting and the link between obesity and cancer ($p<0.05$) (Table 3).

Table 3: Association between gender and knowledge of various lifestyle factors associated cancer risk in later life (n=360).

Lifestyle factors	Gender		Chi square $\chi 2$	P value
	Male (%)	Female (%)		
Passive smoking	87.10	87.40	0.008	0.93
Tobacco use effects on reproductive system	87.60	96.80	10.935	<.001
Insufficient intake of fruits/vegetables, daily intake of sweets and/or sugary drinks, and high fat diets	25.90	30.50	0.953	0.329
Long-term sitting	30	45.80	12.797	0.005
Obesity	28.20	43.20	8.66	0.003

Table 4: Association between age and knowledge of various lifestyle factors associated cancer risk in later life (n=360).

Lifestyle factors	Age (%)	Chi square $\chi 2$	P value
Passive Smoking	96.40	12.575	0.014
Tobacco use effects on reproductive system	96.40	2.006	0.735
Insufficient intake of fruits/vegetables, daily intake of sweets and/or sugary drinks, and high fat diets	52.70	37.93	<.001
Long-term sitting	29.10	57.337	<.001
Obesity	63.60	36.96	<.001

The study explored the age-related awareness of cancer risk factors using a chi-square test. Individuals aged 30-34 years had the highest awareness (96.40%) of passive smoking and tobacco's reproductive effects. Age significantly influenced awareness of passive smoking ($p<0.05$), but not the reproductive effects of tobacco ($p>0.05$). In the same age group, awareness of various factors like insufficient fruit/vegetable intake, daily sweets/sugary drinks, high-fat diets (52.70%), prolonged sitting (29.10%), and obesity (63.60%) showed highly significant age-related differences ($p<0.05$) (Table 4).

Overall, 71.7% reported that they had received information on cancer prevention with 69.7% from internet, followed by school/teacher (55.0%), physicians (35.6%), family (33.7%), scientific journals (13.2%) and others (6.6%). Additionally, all participants, 360 individuals (100%), expressed interest in receiving more information on cancer prevention at their current age.

DISCUSSION

This study aimed to assess awareness of cancer risk-related lifestyle factors among Adolescents and Young Adults (AYAs) at Panjab University. While prior research predominantly focused on adults due to higher cancer incidence with age, recognizing that many cancer-related behaviours emerge during adolescence and young adulthood is crucial. Assessing awareness and adoption of risky behaviours in this demographic is vital for designing targeted public health interventions to alleviate the future cancer burden in older populations.

The study found high awareness levels among students, with 98.9% familiar with the term "cancer" and 97.8% having knowledge about risk factors. Similar findings were observed in previous study conducted in Italy [2]. However, concerning gaps in awareness were identified, revealing significant disparities in understanding. Higher awareness was observed for smoking (96.4%) and alcohol use (55.6%), while lower levels were seen for consuming sweets and sugary drinks (16.7%), high-fat diets (23.9%), and the consequences of overweight/obesity (33.1%). Similarly, protective behaviours such as consuming fruits/vegetables (15.3%) and engaging in physical activity (23.9%) were also not well understood. These findings align with previous studies, emphasizing the need for improved awareness on positive lifestyle factors.[2,9]

A significant majority (98.3%) of the participants acknowledged the seriousness of cancer as a disease, demonstrating a high level of awareness regarding its severity. Additionally, around two-thirds (63.6%) of the respondents believed cancer as preventable condition. However, in the previous study, it was reported that 95.4% of participants recognized cancer as a serious disease, but only 33.5% believed in its preventability.[2]

The study indicated a low prevalence of smoking, with only 10.3% currently use tobacco products, and 56.8% reported daily use of less than five cigarettes or bidis. Smokeless tobacco use was relatively low at 2.7%. On contrary, previous studies reported higher smoking rates, with 25.3% and 31.6%.[2,10,11] This disparity suggests potential changes in smoking behaviours over time or variations in the demographics of the study populations. The results underscore a strong awareness among the participants regarding the harmful effects of smoking (98.6%), association between passive smoking and cancer risk (87.2%), as well as the negative effects on the reproductive system and cancer risk in later life (92.5%), indicate a comprehensive knowledge of the adverse impacts of tobacco use.

The current study indicates that 15.0% of participants consume fruits on a daily basis, while 41.9%, consume vegetables daily. However previous study reported, only 20% of them eat fruits every day, while around 13% eat vegetables every day.[13] Additionally, 37.2%, reported consuming fruits, and 69.7% reported consuming vegetables twice a day. However, the previous studies reported that only 19.2% of the participants consumed fruits or vegetables more than once a day, indicating a lack of emphasis on these healthful food choices.[2,12] In terms of unhealthy dietary choices, 28.6% of the participants acknowledged consuming high-fat foods and 25.6 % reported consuming snacks, sweets, and sugary drinks as “often”. However, in previous study, majority of students reported indulging in sweets and soft drinks on a weekly basis.[13] On contrary, a concerning 88.1% of the participants in the previous study had a daily intake of sugary drinks, which can contribute to negative health

outcomes.[2] The most concerning finding was that the majority of participants (71.7%) reported being unaware of the cancer risks associated with inadequate fruit and vegetable intake, regular consumption of sweets and sugary drinks, and high-fat diets. In contrast, a previous study conducted by Lotrean LM, Florea M, et all showed that 71% of participants recognized the protective effect of consuming fruits and vegetables against cancer.[14,15] This lack of awareness emphasizes the need for targeted health education campaigns.

In the present study, 88.1% and 61.4% respectively, were not actively engaged in vigorous and moderate-intensity physical activities, similar to previous studies where 75.2% reported poor physical activity levels [2] and 53.7% never exercised.[2,11] Notably, 27.8% spent 5 to 6 hours in sedentary activities daily, while 23.1% reported 3 to 4 hours. In contrast, earlier studies showed 88.2% spending over 2 hours daily in a sedentary position, and prolonged leisure-time sitting (6 or more hours/day) linked to 10% increased risk of total cancer in women.[2,16] However, a positive aspect emerged with 43.3% reported breaks from sitting every hour, offering potential health benefits. Merely 38.3% were aware of the health risks linked to prolonged sitting. In contrast, previous studies showed higher awareness, with 81.5% of students acknowledged the preventive benefits of physical activity against cancer and 66% had knowledge regarding the connection between physical activity and cancer prevention.[14,15] The current study emphasized the need to encourage physical activity and decrease sedentary behaviour among AYAs for lowering cancer risk and enhancing overall health.

In the current study, 49.7% of participants were classified as overweight (BMI 23.0 to 24.9 kg/m^2), with 41.4% had never attempted weight loss. 36.1% were aware of obesity's long-term cancer risks, similar to a previous study (45%).[15] This contrasts with a previous study where 66% of overweight students acknowledged their excess weight, and 62% actively tried to lose weight in the past year. Moreover, 60% recognized the link between being overweight and increased cancer risks.[14] The current study reveals diminished awareness and proactive efforts related to weight management and cancer risk compared to the earlier study. This underscores the necessity for targeted interventions aimed at enhancing understanding of the obesity-cancer link and promoting healthier weight management practices among adolescents and young adults.

In present study, 71.7% of respondents received information on cancer prevention, primarily from the internet (69.7%), school/teacher (55.0%), physicians (35.6%), and family (33.7%). All participants expressed interest in receiving more information on cancer prevention at their current age. Comparatively, in previous study, 68.9% received information, mainly from parents (43.3%), the internet (36.6%), healthcare professionals (24.9%), and schools (17.6%). Additionally, 83.4% felt the need for more information about cancer prevention.[2] These findings underscore a positive trend of participants actively seeking and desiring more knowledge on cancer prevention.

This study has few limitations. Due to time and resource constraints, no follow-up was conducted. The study focused exclusively on a specific geographic area in Chandigarh, cautioning against generalizing results. Additionally, participants weight and height were self-reported rather than directly measured.

CONCLUSION

The study among AYAs at Panjab University highlighted disparities in knowledge with high awareness of smoking but lower levels of awareness regarding lifestyle behaviours associated with cancer risk, including poor dietary habits, insufficient physical activity and obesity. To address the gaps in knowledge and promoting healthy behaviours related to cancer prevention among AYAs, a comprehensive approach is recommended. This includes tailored health education programs, collaboration with educational institutions, media campaigns, involvement of healthcare professionals and parents' role in shaping AYAs' attitudes.

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