

Original Research Article

A cross-sectional study to estimate the knowledge and practices regarding trans fats among Panjab University students, Chandigarh

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ABSTRACT

Background: Trans fats also infamous as ugly fat is unsaturated fat which is formed in industries by hydrogenation of monosaturated fat by thermal processing etc. to make cheaper plant fat look like animal fat. Various organizations like FSSAI have given guidelines on trans fats. WHO has committed to removing industrially produced trans fats by 2023. Objectives of current study were to estimate the knowledge and practices about trans fats among university students and do a comparative analysis of knowledge and practices about trans fats among different groups of university students.

Methods: The study was conducted at Panjab university. Total N=362. Data were analyzed and comparison was done on basis of gender, educational level, place of stay, and family income.

Results: 72% students had knowledge regarding trans fats, males (73%) had more knowledge than females (70%) ($r=-0.09$, $p<0.05$). Hostellers (85%) had more knowledge than day scholars (75%) and students staying in rented accommodation (60%) regarding trans fats ($r=-0.015$, $p<0.05$), 58% students had good practices while remaining 42% lack good practices regarding trans fats, students in rented accommodation (64%) had better practices than day scholars (32%) and hostellers (43%) regarding trans fats ($r=0.028$, $p<0.05$).

Conclusions: It was found youth lack awareness and knowledge (28%) regarding trans fats, had wrong practices (42%) regarding trans fats and the adoption of food containing trans fats among youth is common.

Keywords: Trans fats, Cardiovascular disease, Consumer, Obesity

INTRODUCTION

Trans fats also called trans fatty acids are found to be associated with terms like partially hydrogenated oils (PHOs), cholesterol, hyperlipidemia, atherosclerosis, hardening of the arteries, hypercholesterolemia, coronary artery disease, heart disease, peripheral artery disease-trans fat, (PAD-trans fat), stroke, heart healthy diet. They are also infamous as ugly fat. It is unsaturated fat which is formed in industries by hydrogenation of monosaturated fat by thermal processing etc. to make cheaper plant fat look like animal fat. Though we also have natural

trans fats which are formed by biotransformation in the rumen of animals, they are not so dangerous for our health. These industrially produced trans fatty acids (TFAs) are unsaturated fats that act like saturated fats because of their chemical structure the main difference which can be seen in the figure below is the position of hydrogen atoms in the double bonded carbon atoms.¹⁻³ Unsaturated fats are molecules of fat-containing one or more double bonds between two atoms of carbon at specific positions in the chain. Unsaturated fats come in a 'cis' form and a 'trans' form, according to the arrangement of the carbon chains across one or more double bonds. Trans fats are unsaturated fats with trans double bonds

instead of cis bonds. The type of bond affects the shape of the fatty acid chain. A trans bond creates a straight chain, whereas a cis bond results in a bent chain. Trans fats may be monounsaturated or polyunsaturated. They came from 3 main sources; the artificial source which includes industrial processing of vegetable oils, the natural source as its presence in small amounts in dairy products and meat and heat treatments of food. Therefore, TFAs may present as high as 50g/ 100g in a variety of baked, manufactured and processed restaurant foods where hydrogenated oils are used in this processing such as cooking, frying, and baking. Trans Fats or TFAs are used in packaged and restaurant food to make them more palatable, and stable over time, and to increase the shelf life of these foods. Moreover, TFAs are used for frying for their increased resistance to high temperatures.³ But, repeated use and heating like restaurant frying of certain foods (such as French fries, and fried chicken), alter the chemical structure of the used liquid oil. TFAs are available in a high percentage in restaurant food and fast food.

Total TFAs intake was associated with an increased risk of cardiovascular disease (CVD as well as an increased risk for coronary heart disease (CHD) mortality.⁴ They increase the risk of heart disease by increasing the low-density lipoprotein (LDL) and lowering the high-density lipoprotein (HDL) in the blood. It has been reported that TFAs intake is responsible for more than 82,000 deaths/year in the United States and more than 72,000 cardiovascular disease-related deaths/year could be prevented if artificially produced TFAs intake is reduced to 1%. There is also strong evidence that industrially produced TFAs intake is associated with the development of diabetes and breast cancer.⁵ There is existing evidence supporting that young people's intake of products with few nutrients but high in saturated fats and TFAs is associated with overweight and obesity. In turn, young people who become overweight or obese are at an elevated risk for a variety of nutrition-related chronic diseases that can affect them for the rest of their lives. Among various countries, Denmark was the first country to eliminate trans fats in 2004.³ Trans fats have been stated to increase the level of LDL and decrease the level of HDL thereby causing an increased risk of cardiovascular diseases and emerging as one of the major challenges to public health in the 21st century. SDG goal no. 3 talks about maintenance of good health also various organizations like FSSAI have given guidelines on trans fats. WHO has committed to removing industrially produced trans fats by 2023. WHO has released replace-step by step guide to eliminate industrially-produced trans fats. FSSAI has committed a reducing percentage of trans fats by 5 per cent; also they sought for mandatory declaration of a quantity of trans fats on the product label. The FSSAI has capped the number of trans fatty acids (TFA) in oils and fats to 3% for 2021 and 2% by 2022 from the current permissible limit of 5% through an amendment to the food safety and standards (prohibition and restriction on sales) regulations.

FSSAI launched a “trans fat-free” logo for voluntary labelling to promote TFA-free products. The label can be used by bakeries, local food outlets and shops for preparations containing TFA not exceeding 0.2 per 100 g/ml. FSSAI launched a new mass media campaign “heart attack rewind” to eliminate industrially produced trans fat in the food supply by the year 2022. Heart attack rewind is a follow-up to an earlier campaign called eat right, which was launched in July 2018. Edible oil industries took a pledge to reduce the levels of salt, sugar, saturated fat and trans fat content by 2% by 2022. Swasth Bharat Yatra, an initiative started under the “eat right” campaign is a pan-India cyclothon to engage citizens on issues of food safety, combating food adulteration and healthy diets.⁶ WHO launched a replace campaign in 2018 for the global-level elimination of trans-fats in industrially produced edible oils by 2023.⁷

METHODS

Study design, location, tool and duration

Current study was a cross-sectional observational community-based study conducted at Panjab University, Chandigarh. Pre-structured questionnaire was developed for the study. Participants were given consent forms with information about the study, they were asked to sign if willing to take part. Participants' confidentiality was assured and maintained from the beginning to the end of the study. Current study was conducted for a period of 6 months from January 2022 to June 2022

Sampling technique and sample size

Convenient sampling technique was used in current study. Optimum sample size for the proposed study is calculated on basis of anticipated 62% awareness among the community observed in previous study.¹ Based on 95% confidence level and 5% relative precision optimum size sample size comes 362. Sample size was calculated by using the following formula:

$$\text{sample size } (n) = Z^2 pq/d^2$$

Where Z=1.96 for 95% confidence interval, p=proportion of population with certain characteristic, q=proportion of population without certain characteristic, and d=allowable error (0.05 for 5%).

Data collection and analysis tool

Data was collected with the help of a questionnaire. Data was analyzed with the help of Microsoft excel and SPSS version 20 for windows (IBM Corp. Armonk, New York, USA)

Inclusion and exclusion criteria

Those students of Panjab University who gave consent for participation in the study were included. Those

students who did not give consent to be a participant in the study or semi-filled questionnaire were excluded. A pilot study was conducted on 15 April 2022 on 10 subjects to test the questionnaire framed for the study. The relevant changes were made in the questionnaire. Data were analyzed using descriptive statistics including frequency distribution and inferential statistics. A Chi-square test was performed to test the statistical significance and Pearson correlation coefficient analysis.

RESULTS

Total 362 students participated in the study with an age range between 20-34 years as shown in (Table 1). Out of which 211 were males and 151 were females as shown in (Figure 5). The mean age of students was 23.40 years and a standard deviation of 2.937.

Table 1: Participants demographic details (n=362).

Parameters	N	%
Family income		
<15000	229	63.1
15000-30,000	100	27.5
30,000-60,000	32	8.8
>60,000	1	0.3
Family type		
Nuclear	171	47.2
Joint	191	52.8
Religion		
Hindu	273	75.4
Christian	21	5.8
Sikh	63	17.4
Others	5	1.4
Place of stay		
Hostel	183	50.6
Day scholar	129	35.6
Rented house	50	13.8
Education		
Undergraduate	223	61.6
Postgraduate	139	38.4
Medical history		
Present	106	29.3
Absent	139	38.4

Medical history

About 106 students were found with medical history. Most students mentioned hypertension (36%), allergies (11%) while few students mentioned skin infections (2%), varicocele (3%), and diabetes (1%).

Knowledge and awareness regarding transfats

The overall knowledge regarding transfats in the population is calculated by assigning scores to the students based on their responses to the questionnaire. Those having a >7 score out of 15 are categorized as having substantive knowledge regarding transfats while

those having less or equal to 7 scores were categorized as lacking substantive knowledge regarding transfats. The pie chart shown in the figure shows the overall knowledge among the students. Thereafter, the overall knowledge regarding transfats among universities was analyzed using the Chi-square test, and was compared based on gender, place of stay, religion, Education level, family income, and family type. The table shows a summary of the Chi-square test for comparison between knowledge and various factors. Results of Chi-square tests for comparison of gender and place of stay with knowledge and awareness regarding transfats show $p < 0.05$, which shows a significant relationship between gender and place of stay with knowledge and awareness regarding transfats. Whereas when compared with religion, level of education, family income and family type, the result shows $p > 0.05$, which shows no significant relationship between religion, level of education, family income, family type with knowledge regarding transfats.

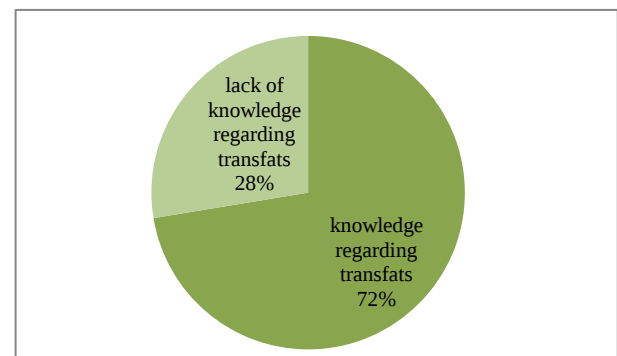


Figure 1: Overall knowledge regarding transfats among university students.

Table 2: Summary of Chi-square for knowledge and various factors.

Characteristics	Chi-square	df	P value
Gender	24.29	11	0.012
Place of stay	62.796	22	0.00
religion	73.20	33	0.60
Education level	9.65	11	0.56
Family income	60.105	33	0.08
Family type	31.14	11	0.07

Practices regarding transfats

The overall practices regarding transfats in the population is calculated by assigning scores to the students based on their responses in the questionnaire. Those having >5 score out of 10 are categorized as having good practices regarding transfats while those having less or equal to 5 scores were categorized as lacking good practices regarding transfats. The pie chart shown in (Figure 2) shows overall practices regarding transfats among the students. It can be inferred that 58% of students were having good practices regarding transfats while 42% of students were lacking good practices regarding transfats.

The table shows a summary of the chi-square test for comparison between knowledge and various factors. Results of the Chi-square test for comparison between the place of stay with practices regarding transfats show $p < 0.05$, which shows significant relation between the place of stay with practices regarding Transfats. Whereas on comparing practices with gender, religion, education level, family income, and type of family study found $p > 0.05$, which shows no significant relationship between practices regarding gender, religion, education level, family income, or type of family.

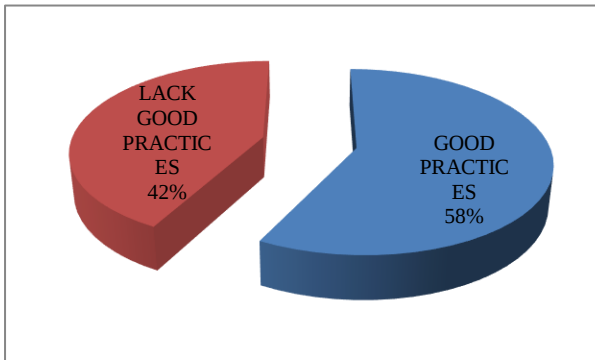


Figure 2: Overall practices regarding transfats among university students.

Table 3: Summary of chi-square for practices regarding transfats in comparison with various factors.

Characteristics	Chi-square	df	P value
Gender	18.204	10	0.052
Place of stay	40.906	20	0.004
Religion	19.741	30	0.923
Education level	33.114	10	0.06
Family income	15.57	10	0.112
Family type	15.51	10	0.111

Summary of Pearson correlation coefficient analysis

The Pearson correlation coefficient (r) analysis was done for gender, place of stay with knowledge regarding transfats as these variables were statistically significant in the chi-square test. The test was done to ascertain whether males were having more knowledge than females. Whether hostellers have more knowledge or the day scholars, in the same way, analysis was done between the place of stay and practices regarding transfats.

Gender based study

Knowledge regarding transfats: the males were scored as 1, while females were scored as 2. On performing the Pearson correlation coefficient test, the Pearson coefficient (r) came as -0.09, which is a negative integer which shows as the scores will increase the significance will decrease which means males have more knowledge

regarding transfats than females and it is statistically significant in Pearson coefficient correlation ($p = 0.047$) which is less than 0.05 as can be seen in (Figure 4). Thereafter, cross-tabulation of knowledge scores of males and females, we found that 73% of males knew transfats while 70% of females knew transfats.

Table 4: Summary of Pearson correlation between factors which were statistically significant in Chi-square test.

Parameters		
Knowledge		Gender
Pearson correlation	-0.09	1
Significance (2-tailed)	0.047	
N	362	362
Knowledge		Place of stay
Pearson correlation	1	-0.015
Significance (2-tailed)	0.034	
N	362	362
Practices		Place of stay
Pearson correlation	1	0.028
Significance (2-tailed)	0.03	
N	362	362

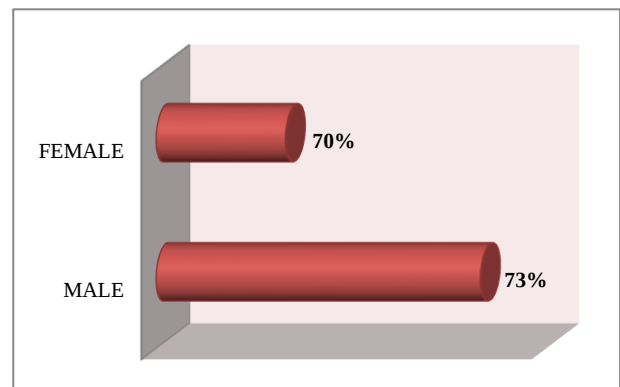


Figure 3: Knowledge regarding among different gender.

Place of stay based evaluation

Knowledge regarding transfats: the hostellers were scored 1, day scholars were scored 2, and students staying in rented accommodation were scored 3. On performing the Pearson correlation coefficient test, Pearson coefficient (r) came as -0.09, which is a negative integer which shows as the scores will increase the significance will decrease which means hostellers have more knowledge regarding transfats than day scholars, and residents of rented houses which is statistically significant in Pearson coefficient (r) correlation ($p = 0.034$) which is less than 0.05. Thereafter, cross-tabulation of knowledge scores of males and females, we find 85% hostellers, 75% day scholars, 60% rented accommodation knowing transfats, Practices regarding transfats: the hostellers were scored 1, day scholars were scored students staying in rented accommodation were scored 3. On performing the

Pearson correlation coefficient test, Pearson coefficient (r) came as 0.028 which is a positive integer which shows as the scores will increase the significance will increase which means students staying in rented accommodation having better practices regarding transfats than hostellers and day scholars which is statistically significant in Pearson coefficient correlation ($p=0.03$) which is less than 0.05. Thereafter, cross-tabulation of knowledge scores of males and females, we found 64%. Rented, 32% day scholars, 43% hostellers had good practices regarding transfats.

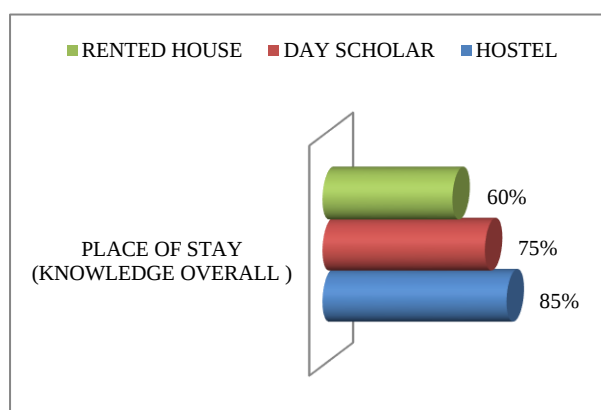


Figure 4: Knowledge regarding transfats in different place of stay.

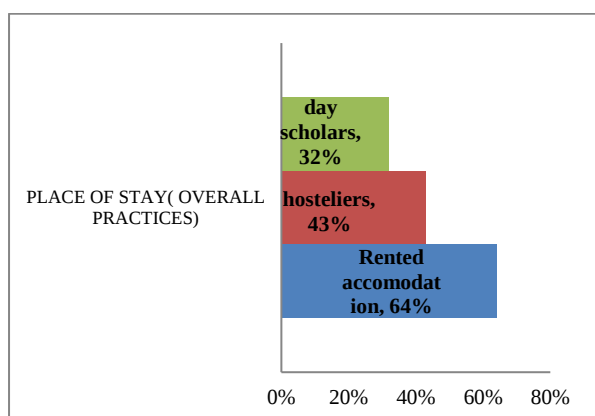


Figure 5: Overall practices based on place of stay.

DISCUSSION

This cross-sectional study was conducted among the students of Panjab university to understand the knowledge, awareness and practices regarding transfats. The mean age of the participants for this study was 23.40 years with $SD=2.937$ meaning that the study participants had relatively a young large population around the mean age. Other studies had around the same mean age of the participants, for instance the study conducted by Banseria et al and Kamel et al had participants with a mean age of 20 years, and 19 years in their study.¹ The study found out that knowledge regarding transfats is 72%. This is similar to other studies which found their prevalence

close to the current study. in their study by Banseria et al it was found that knowledge and awareness regarding transfats 62%.whereas some studies like by Eckel et al showed 92% had awareness regarding transfats.⁸ This divergence may be due to their conduct of the study in developed countries due to their high literacy rates. The study found out that the appropriate practice regarding transfats is seen in 58% of the population. This is similar to Eckel et al study in which good behaviour regarding transfats was reported in 37% of the respondents. Whereas some studies like Kamel et al shows 79.5% of respondents had not been reading food label showing negative behaviour towards transfats.⁹ This divergence may be due to language barriers, and a lack of awareness regarding global initiatives in these populations. The study found that 73% of males and 70% of females had overall knowledge regarding transfats. Similar to a study by Mandoura et al in which 85% of males and 87% of females knew transfats. This deficit in knowledge related to food may result in a lack of motivation to integrate certain food habits into their dietary habits such as food label use. The study shows a significant relationship between gender and knowledge regarding transfats ($p=0.012$), which is less than 0.05. in the study male (73%) were found to have more knowledge than females (70%) regarding transfats. In similar studies for example Mandoura et al study where the relationship between gender and knowledge regarding transfats was found statistically significant. Some studies for instance Dhaka et al show females are more knowledgeable than male students regarding transfats. This may be due to their dominant role in dealing with household food also females may be more interested and concerned about their body image, diet and health. but this trend was not reflected in our study may be because of the growing awareness among men due to the growing gym culture. The relationship between gender and knowledge regarding transfats was also reported by the American psychological association as stated by westenhoefer et al. The study shows a significant relationship between place of stay and knowledge regarding transfats ($p=0.00$), which is less than 0.05. Similar studies for instance show a relationship between place of stay and knowledge regarding transfats. It can be due to reasons like students living away from their families may hold the responsibility of purchasing and preparing their food. The study shows no significant relationship between education level and knowledge regarding transfats ($p=0.56$) which is greater than 0.05. some studies show the result which is in contrast to our study for instance Mandoura et al study shows a significant relationship between education level and knowledge regarding transfats. This may be due to increased exposure to the topics of health and related issues with higher levels of education. this was not evident in our study may be due to increased education dissemination in the 2020s because of 4g and increased digital literacy. The study shows no significant relationship between family income and knowledge regarding transfats ($p=0.08$) which is greater than 0.05. but some studies show results which are in

contrast to our results. For instance, in the study conducted by Dhaka et al there was a significant relationship observed between knowledge regarding trans fats and family income.¹⁰ this may be because socioeconomic groups usually have different priorities and perspectives containing food choices. People with lower levels of socioeconomic positions were reported to be of lower levels of nutritional knowledge compared with those of higher socioeconomic status in the study conducted by Eckel et al and people with low SEP were found to be lower users of printed materials that publish guidelines. While studying the relationship between place of stay and practices regarding trans fats, Karn et al showed a significant relationship between the place of stay ($p=0.004$) which is less than 0.05.¹¹ While on analysis of correlation (r) it was observed that students staying in rented accommodation had better practices regarding trans fats than those staying in hostels. The results were similar to a study conducted by Sogari et al where college students residing on campus were found to be more inclined toward junk food. There may be many reasons for this for instance time constraints included the time length available for choosing good food as reported by Eckel et al social association in hostels also encourages bad practices regarding junk foods (trans fats) as reported by Sogari et al.¹²

Limitations

Limitations of current study were the study was conducted in the small area and it should be taken up in a larger area. The health problems were self-stated, based on their level of health awareness, by the participants and no clinical evaluation of their health status was done to verify the findings. Time factor was an issue instead convenient type of sampling was used hence not all departments were represented in the study.

CONCLUSION

It was concluded through current study that many youths lack awareness and knowledge (28%) regarding trans fats, Many had wrong practices (42%) regarding trans fats and also the adoption of food rich in trans fats among youth is common. The study fills the research gap by estimating the awareness regarding trans fats among university students in India which was not undertaken exhaustively especially in northern India. The study shows that there is an association between gender, place of stay and knowledge regarding trans fats and a significant association between place of stay and practices regarding trans fats. Hence, there is a need to focus on education and environmental changes through awareness campaigns like organizing nuked Natak, pamphlet distribution, organizing poster and essay writing competitions, medical camps, health education workshops etc. and also policy makers should consider strict measures to disseminate information regarding trans fats among university students.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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