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DIETARY HABITS OF DENTAL STUDENTS ON ACRYLAMIDE RICH FOOD: A CROSS-SECTIONAL STUDY

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ABSTRACT:

Background
One of the biggest concerns regarding university students' health is their eating habits. This study aimed to evaluate the dietary profile of dental students high in acrylamide and how these patterns relate to physiological, psychological, and sociodemographic aspects. Acrylamide is a white, crystalline substance produced when carb meals are cooked at high temperatures or undergo other thermal processing.

Methodology
212 undergraduate dentistry students from SRM Institute of Science and Technology, ages 19 to 26, participated in this cross-sectional study. Students ranged in academic year from first to fourth. A questionnaire covering questions on food habits, physiological psychological variables, and sociodemographic was used to collect the data.

Results
Hostel students took acrylamide-rich food more during weekends. They preferred golden yellow hue bread toast and French fries with low Acrylamide content—a robust association between the Acrylamide intake and physiological and psychological variables.

Conclusion
The majority of the students who consumed the AA-rich food were hostelers. They consumed high quantities during weekends whenever they were with their peers. Since acrylamide is known to cause cancer, younger people should be made aware of its potential health risks.

Keywords: Acrylamide, Dietary habits, Dental students, psychological factors, sociodemographic factors.

1. INTRODUCTION

First-year dental and medical students are stressed, which may hurt students' cognitive functioning and learning in medical school. The female students' psychosocial stress level was higher compared to the male students.[1]
Medical students preferred having fried snacks followed by various bakery items[2,3]. Medical students in state universities were shown to have poor eating habits characterised by meal skipping, fried food snacking[4]
“Millard reaction” is the formation of Acrylamide when free asparagine and reducing sugars react together while heating the food at 120 degrees[5]. According to the report given by EFSA high Acrylamide levels were found in fried potato (1mg/kg) and coffee products(5mg /kg).[6]

Acrylamide levels in food are influenced by the cooking time, method and temperature of the cooking process[7]. Few studies reported Acrylamide exposure leads to increased risk for renal, endometrial, and ovarian cancers[8]
Higher acrylamide intake may lead to Type 2 diabetes, mutations and damage to DNA[9]. IARC predicted Acrylamide as a Human carcinogen[10]
Research questions:
It has been discovered that there is insufficient research on Indian college students' intake of foods high in acrylamide. Thus, this study aimed to learn more about the eating habits of a health institute's undergraduate dental students.
RQ1: To evaluate the socio-demographic profile of dental students
RQ2: To evaluate the Acrylamide (AA) rich dietary habits of dental students
RQ3: To evaluate the association between psychosocial factors and AA-rich dietary intake
RQ4: To evaluate the association between physiological factors (menstrual cycle) and AA-rich dietary intake among female students.
Material and Methods:
Using a stratified sample technique, 216 dental students from SRM Dental College in Chennai—170 females and 42 males—participated in this descriptive cross-sectional study. It took place in May and June of 2023. The Institutional Ethical Board approved this project, ETHICS CLEARANCE NUMBER: SRMIEC-5T0323-356. Every student was explained well about the purpose of the study and asked to give their informed consent. Students who refused to take part in the study were excluded from the study. A standard questionnaire that covered sociodemographic, dietary, psychological, and menstrual profiles[2]. The statistical data was analysed with SPSS (version 25 Inc., IBM)

2. RESULTS AND DISCUSSION

RQ1: Sociodemographic profile
Study population
Acrylamide consumption is higher in the youth[11]. 50% of the students in the current study with an average age group of 17–23 years. Of them, 19.8% were men and 80.2% were women. (Table 1). In our study 84.76% of day scholars and 75.70% of hostelers were females. (Table2)
RQ2: AA – Rich Dietary habits
Students' preference for taking AA-rich food
The association between individual and peer snack consumption was strong in boys, 75 % of students in the current study had food high in acrylamide when they moved around with their peers during weekends, these results were following the study conducted by Heba (2022)[12]. (Table 3)
Various foodstuffs contain Acrylamide, the levels are 135 µg/kg to 1139 µg/kg in roasted coffee powder, 211 µg/kg to 3515 µg/kg in potato chips, and 36 µg/kg to 1411 µg/kg in French fries[13]. In our study, 20.8% of the students preferred taking instant coffee, 7.1% taking potato chips and 1% liked to have French fries. (Table 4)
Frying chicken nuggets in the traditional method increases the level of acrylamide. Conventional method (220 °C and 6 minutes) of cooking Shrimp nuggets produces the highest amount of acrylamide (27 ± 1.5 ng/g)[14]. According to the study conducted by Hassan et al. (2020), junk foods and fried foods were preferred by students[15]. Similarly, the current study also showed that 82.86% of the day scholars and 94.39% of the hostel students were non-vegetarians, who preferred eating deep-fried AA-rich food (Table 5)
Higher amounts of acrylamide (530–1100 microg/kg) were observed after pan-frying boiling potato cubes as opposed to wedges (140–250 microg/kg)[16]. In the current study, 50.5% of

students preferred steamed boiling potato wedges, while 49.5% of students selected pan-fried, boiled potato cubes with a high acrylamide level. (Table 4)

Duration of consumption:

39.26% of students reported consuming food high in acrylamide for fewer than five years (Table 6 Figure 1) Data on human carcinogenicity revealed no appreciable increase in cancer after brief exposure. It is expected that acrylamide will cause cancer in people who have a long duration of exposure.[17]. In the current study, 32.08% had been consuming foods high in acrylamide for more than ten years. (Table 4, 6)

Frequency of AA consumption and health implications

Daily consumption of AA is estimated as 0.3 - 0.6 µg/kg of body weight (BW) for a person [17]. In the current study, 59.9% of students consumed 1-3 packs/day and 1.9% consumed more than 5 packs/day. (Table 4) There was a strong association between AA and ovarian cancer[18]. 39.2% of the students take Acrylamide food twice a week (Table 4). Our findings differed from those of the study by Ganasegeran et al.(2012), which indicated that 73.5% of medical students ate fried food more than twice a week. Acrylamide is an effective clastogen[19].

Consumption of AA in different methods of cooking:

The most (100%) favoured junk food item of adolescent students was potato chips[20]. Based on the colour of the French fries, the level was measured as toasted (2274 µg kg−1), dark-golden (463 µg kg−1), golden (134 µg kg−1), and light-golden (52 µg kg−1). The acrylamide level of all the golden and light-golden samples was found to be below the threshold[21]. In our study, 47.6% of participants liked eating French fries that were golden yellow, and 37.7% said they preferred deep-fried brown fries. Of the participants, 34.4% favoured crispy dark brown toast and 41% liked light brown toast. (Tabel 4, Figure 2)

RQ4: Influence of Psychological Factors on AA Intake:

Decreased consumption of healthy foods and increased consumption of unhealthy foods are linked to stress[22]. As per Naik et al. (2024), the maximum consumption of junk food was taken during social gatherings[23]. According to our study, 53.27% of hostelers and 51.12% of students ingested more AA food when they were cheerful (Table 7, Fig 3). Our study results were similar with Naik et al stating that Junk food consumption was higher among students staying with friends (35.3%) than among those staying with family (13.8%)[23].

Our study proved the statements given by Naik et al, Matheus Lopes Cortes et al, and Deborah Hilla et al, that high consumption of AA-rich food was taken during high perceived stress levels. [22,23, 24]. There is an association between acrylamide-rich food consumption and the psychological status of the participant. (Table 7 Figure 3)

RQ4: Influence of Menstrual cycle on AA intake:

Consumption of Deep-fried high-calorie food was higher during the Luteal Phase compared with the Follicular phase of the menstrual cycle[25]. It was proved in our study that there was association between acrylamide-rich food consumption and the pre-menstrual phase of the menstrual cycle. (Figure 4)

Table 1: Sociodemographic profile

Socio-demographic data	**N (%)**
Age distribution	N = 212
17 -18	88 (41.5)
19 – 20	106 (50)
21 – 22	16 (7.5)
22 – 23	2 (09)
Gender	
Male	42 (19.8)

Female	170 (80.2)
Nationality	
Indian	211 (99.5)
NRI	1 (5.5)
Stay	
Days scholar	102 (48.1)
Hosteller	110 (51.9)

Table 2 Gender between Day Scholar and Hosteller (n= 212)

	Day Scholar	**Hosteler**
Male	16 **(**15.24%)	26 (24.30%)
Female	89 (84.76%)	81 (75.70%)
Total	105	107

Table 3 Association of Acrylamide rich food consumption between Day Scholar and Hosteller during weekdays and weekends (n= 212)

	Day Scholar	**Hosteller**	**Total**
Week Days (%)	26 (24.76%)	26 (24.30%)	52 (24.53%)
Week Ends (%)	79 (75.24 %)	81 (75.47%)	160 (75.47%)

Table 4 Dietary Profile

Dietary Habits Questions	**N (%)**
when do you take more Fried/ processed food	
Weekdays	49 (23.1)
Weekend	163 (76.9)
I prefer taking ---- often	
Biscuits / Crackers	16 (7.5)
Breakfast cereals	21 (9.9)
Crisp Bread	12 (5.7)
French Fries	03 (1.4)
Instant Coffee	44 (20.8)
Potato chips	15 (7.1)
I don’t take anything from the above list	101 (47.6)
I prefer eating potatoes in this form	
Pan-fried potato cubes	105 (49.5)
Roasted / Boiled / Steamed Potato wedges	107 (50.5)
I prefer eating ------ color French Fries	
Brown	80 (37.7)
Yellow	101 (47.6)
I don’t take	31 (14.6)
I prefer eating ------- Toast	
Dark Brown toast	73 (34.4)
Light brown toast	110 (51.9)
I don’t take	29 (13.7)
I consume the above-given AA rich food	
1 – 2 times/week	83 (39.2)

3 – 4times /week	25 (11.8)
Every day	07 (3.3)
Rarely	97 (45.8)
I consume ---- packs (1pack = 50 - 75 grams) of AA rich food per week	
0 packs	68 (32.1)
1 – 3 packs	127 (59.9)
4 -5 packs	13 (6.1)
More than 5 packs	4 (1.9)
I have been consuming my favourite (above given) AA rich food for ----	
< 5 years	84 (39.6)
6 – 10 years	60 (28.3)
>10 years	68 (32.1)

Table 5 Comparison of Food Habits between Day Scholar and Hosteller (n= 212)

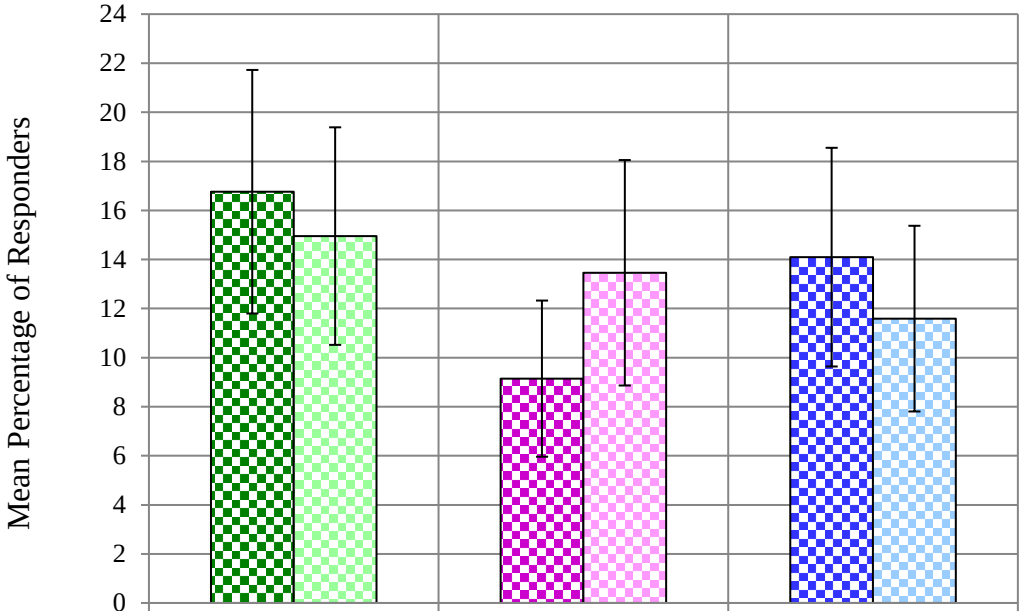
	Day Scholar n=105 (49.53 %)	Hosteller n=107 (50.47 %)	Total (n= 212)
Vegetarian	18 (17.14%)	6 (5.61%)	24 (11.32%)
Non-Vegetarian	87 (82.86%)	101(94.39%)	188 (88.68%)

Table 6 Duration of Acrylamide rich food consumption between Day Scholar and Hosteller (n= 212)

	Day Scholar	**Hosteller**	**Total**
less than 5 years (%)	44 (41.90%)	40 (37.38%)	84 (39.62%)
6 - 10 years (%)	24 (22.86%)	36 (33.64%)	60 (28.30%)
More than 10 years (%)	37 (35.24%)	31 (28.97%)	68 (32.08%)

Table 7 Psychological factors in relation to acrylamide-rich food intake of Day Scholar and Hosteller (n= 212)

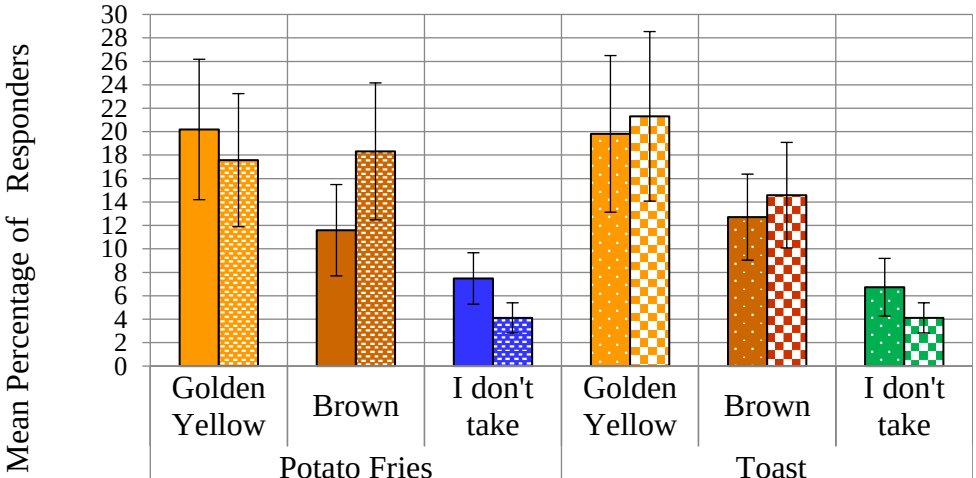
	Happy (%)	**Lonely (%)**	**Nervous (%)**	**Depressed/upset (%)**
Day Scholar	52 (49.52**%)**	18 (17.14**%)**	2 (1.90**%)**	33 (31.43 **%)**
Hosteller	57 (53.27**%)**	16 (14.95**%)**	1 (0.93**%)**	33 (30.84 **%)**
Total	109 (51.42 **%)**	34 (16.04**%)**	3 (1.42 **%)**	66 (31.13 **%)**



	Less than 5 years	6 - 10 years	More than 10 years
Day Scolar	17	9	14
Hosteler	15	13	12

Figure 1: Duration of Acrylamide rich food consumption

Graph illustrates the Duration of Acrylamide rich food consumption in day scholars and hostellers. The percentage of the responders (n-212) was presented as mean ± SEM. Data were analyzed by one-way ANOVA and multiple comparisons between groups were performed by Tukey's test. Statistical significance was achieved at * P<0.05, ** P<0.01 and *** P<0.001.

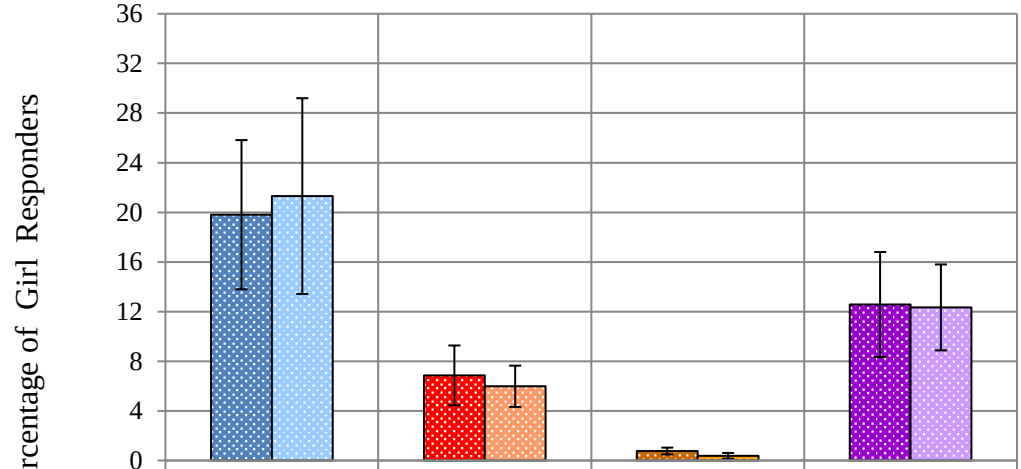


	Potato Fries			Toast		
	Golden Yellow	Brown	I don't take	Golden Yellow	Brown	I don't take
Day Scolar	20	12	7	20	13	7
Hosteler	18	18	4	21	15	4

Fig 2: Preference of eating the colour Potato Fries/Toast

The graph demonstrates the preferential colour of acrylamide-rich food consumed by day scholars and hostellers. The percentage of the responders (n-212) was presented as mean ±

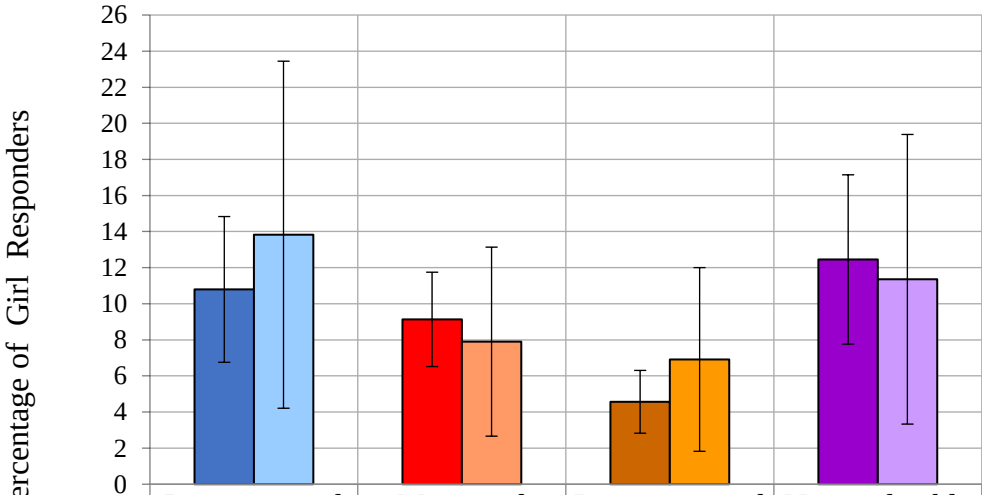
SEM. Data were analyzed by one-way ANOVA and multiple comparisons between groups were performed by Tukey's test. Statistical significance was achieved at * P<0.05, ** P<0.01 and *** P<0.001.



	Happy	Lonely	Nervous	Depressed / upset
Day Scolar	20	7	1	13
Hosteler	21	6	0	12

Fig 3: Association of Psychological factors and Fried food consumption

Graph displays the association of psychological factors and Acrylamide rich food consumption in day scholars and hostellers. The percentage of the responders (n-212) was presented as mean ± SEM. Data were analyzed by one-way ANOVA and multiple comparisons between groups were performed by Tukey's test. Statistical significance was achieved at * P<0.05, ** P<0.01 and *** P<0.001.



	Pre-menstrual	Menstrual	Post-menstrual	Not applicable
Day Scolar	11	9	5	12
Hosteler	14	8	7	11

Fig 4: Association of physiological factors to Acrylamide rich food consumption

The graph demonstrates the association of physiological factors (monthly cycle) to Acrylamide rich food consumption in girls of day Scholars and Hostellers (n=170). The percentage of the

responders was presented as mean ± SEM. Data were analyzed by one-way ANOVA and multiple comparisons between groups were performed by Tukey's test. Statistical significance was achieved at * $P<0.05$, ** $P<0.01$ and *** $P<0.001$.

3. CONCLUSION

A high intake of AA food was taken when the students were happy, and there is a strong correlation between AA intake and psychological factors. Female students consumed more AA intake during the premenstrual phase, and there was a strong correlation between AA intake and the Menstrual cycle. Young university students consumed acrylamide-rich food for more than five years. The majority of the students who consumed the acrylamide-rich food were hostelers, and they consumed high quantities during weekends whenever they were with their peers. Since acrylamide is known to cause cancer, younger people should be made aware of its potential health risks.

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