

Original Article

A Gender-Based Analysis of Stress-Induced Eating Behaviours and Their Health Implications Among College Students in Different States

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ABSTRACT

Objectives: College life introduces psychological stressors such as academic pressure, social adaptation, and lifestyle changes, often impacting eating behaviours. Emotional or stress-induced eating marked by increased consumption of high-calorie, sugary foods is increasingly prevalent among young adults and has been linked to adverse health outcomes. Gender differences further influence coping mechanisms, with females more prone to emotional eating due to biological and psychosocial factors. The study aimed to explore gender-based patterns in stress-induced eating among college students in Karnataka, Kerala, and Andhra Pradesh.

Material and Methods: A total of 555 students participated in the study, comprising 200 from Karnataka, 151 from Kerala, and 204 from Andhra Pradesh. The survey captured demographic data, anthropometric data, emotional well-being, dietary habits, and medical history. Descriptive statistics and Chi-square tests were used to assess gender-based differences in stress-related eating behaviour and associated health outcomes. Data were entered in Microsoft Excel and analysed using IBM SPSS version 22.0.

Results: Gender and regional variations were observed in stress-induced eating behaviours. Female students in Kerala and Karnataka reported higher tendencies toward emotional eating, while males in Andhra Pradesh showed significant stress-related behavioural changes. BMI distribution also differed, with Kerala students exhibiting greater variability across underweight, overweight, and obesity categories. Gender was significantly associated with BMI in Andhra Pradesh ($p = 0.004$). Stress-related eating was linked with changes in appetite, cravings, coping strategies, and physical health indicators such as blood sugar fluctuations and digestive issues, with notable gender-specific differences across states.

Conclusion: The study findings underscore the need for targeted, gender-sensitive interventions to support emotional well-being and promote healthy dietary habits in academic settings.

Keywords: Emotional well-being, Food intake, Mental health, Statistical methods, Stress eating

INTRODUCTION

The transition to college life marks a critical developmental period characterised by newfound independence, academic pressures, social adjustments, and lifestyle changes. Among these, psychological stress is a general experience for many college students and has been broadly acknowledged as a significant factor in health-related behaviours, particularly eating patterns.^[1,2] Stress-induced eating, often referred to as emotional eating, involves the consumption of food, especially energy-dense and high-sugar items, in response to emotional distress rather than physiological hunger. This behaviour has been increasingly reported among young adults and is of growing public health concern due to its association with adverse physical and mental health outcomes.^[3,4]

Many studies have explored the psychological and behavioural implications of emotional eating, linking it with conditions such as anxiety, depression, and poor sleep quality.^[5,6] The COVID-19 pandemic has further exacerbated these issues, contributing to heightened stress levels and a corresponding rise in unhealthy eating behaviours among students.^[3,7] Gender plays a crucial role in modulating stress responses and eating patterns, with females more likely to engage in emotional eating than males, potentially due to differing coping mechanisms, hormonal factors, and social expectations.^[8,9]

Regardless of increasing awareness of emotional eating in academic settings, limited research has systematically investigated its gender-specific patterns across various cultural

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and geographic contexts. Studies conducted in different parts of India and abroad suggest variability in both perceived stress and eating behaviours, influenced by socio-economic factors, dietary habits, and regional disparities.^[10,11] Moreover, stress-induced eating has been implicated in the development of lifestyle-related diseases such as obesity, metabolic syndrome, and cardiovascular conditions, underscoring the need for early intervention among young adults.^[12]

New research has offered significant statistical evidence about the occurrence and trends of stress-induced eating among university students. The university-wide surveys have shown that as many as 45-60% of students indicate engaging in emotional eating when under high stress, with a significantly greater proportion reported by female students.^[1,8] Some cross-sectional investigations have identified perceived stress as the predominant predictor of adverse eating behaviours, explaining a significant percentage of variance in eating patterns even after controlling for confounders like sleep quality, body mass index (BMI), and mental health status.^[4,5] The findings emphasise the importance of using gender-stratified statistical methods to better explain the psychosocial mechanisms that underlie stress-related eating and its health consequences.

The present study aims to conduct a gender-based statistical analysis of stress-induced eating behaviours and their health implications among college students across different states. By identifying gender differences and regional trends in stress-related eating, the study seeks to inform targeted strategies for promoting psychological resilience and healthy lifestyle choices in this vulnerable population.

MATERIAL AND METHODS

Study design

The current study is an institution-based cross-sectional study conducted in a college environment. College students aged 18-29 years, free from medical complications and willing to participate, were recruited from three different states. Students <18 or >29 years, those with medical complications, and those unwilling to participate were excluded. A total of 555 students participated in the study, comprising 200 from Karnataka, 151 from Kerala, and 204 from Andhra Pradesh. Data were collected using a structured and validated questionnaire, which was distributed through Google forms. The questionnaire covered demographic details (age, gender, and education), anthropometric information (height, weight), emotional well-being, dietary behaviour, and medical history. BMI was calculated and classified according to the World Health Organisation (WHO), which categorises individuals as underweight, normal weight, overweight, or obese. Emotional well-being was assessed through questions on

stress levels, triggers, emotional responses, physical activity, and medication usage, while eating habits were evaluated by changes in appetite, frequency of eating outside food, and cravings during stress. The information on personal and family medical history, as well as food allergies or intolerances, was collected to understand the overall health of the students.

Statistical analysis

The data were entered and organised using Microsoft Excel. Descriptive statistics were used to summarise anthropometric data, and frequency distribution tables were used to examine educational status, emotional well-being, and health-related factors. Chi-square tests were conducted to assess gender-based differences in stress-related eating behaviours, including food cravings and emotional reactions. All statistical analyses were performed using IBM SPSS Statistics version 22.0.

Ethical approval

Informed consent was obtained from all the participants prior to data collection. Before the survey questions, participants were presented with a detailed summary outlining the study title, objectives, procedures, potential risks and benefits, assurances of data confidentiality, and researcher contact information. The study protocol was approved by the Institutional Ethics Committee of JSS Medical College, Mysore (ethical code: JSSMC/IEC/130624/2BNCT/2024-2025).

RESULTS

The analysis was conducted to assess the demographic, anthropometric, emotional, and behavioural patterns associated with stress-induced eating among college students across Karnataka, Kerala, and Andhra Pradesh. The study results are presented state-wise to highlight regional variations and gender-specific differences, and the following tables summarise the key findings.

Table 1 summarised the age distribution of students from Karnataka (n = 200), Kerala (n = 151), and Andhra Pradesh (n = 204). The majority of students in Karnataka fall within the 18-21 age group (60.5%), while Kerala shows a more balanced distribution between the 18-21 (46.4%) and 22-25 (53.6%) age groups. Andhra Pradesh has a larger proportion of older students, with 75% in the 22-25 age group and 7.8% in the 26-29 age range. The mean age is highest in Andhra Pradesh (23.14 years), followed by Kerala (21.36 years), and lowest in Karnataka (21.05 years). The SD is highest in Kerala (2.112), indicating a wider spread of ages, whereas Karnataka has the least variability (SD = 1.441). These findings suggest notable inter-state differences in student age profiles, potentially reflecting variations in educational pathways.

Table 1: Age distribution of students across states

Age of students	Karnataka	Kerala	Andhra Pradesh
18-21	121 (60.5)	70 (46.4)	35 (17.2)
22-25	79 (39.5)	81 (53.6)	153 (75)
26-29	0	0	16 (7.8)
Minimum	18	18	18
Maximum	23	25	29
Mean	21.05	21.36	23.14
Standard deviation	1.441	2.112	1.83

Table 2: Distribution of gender and BMI of students in three different states

Characteristics		Karnataka students	Kerala students	Andhra Pradesh students
		n (%)	n (%)	n (%)
Gender	Female	122 (61)	107 (70.9)	90 (44.1)
	Male	78 (39)	44 (29.1)	114 (55.9)
BMI	Under weight	8 (4)	17 (11.3)	19 (9.3)
	Normal	156 (78)	91 (60.3)	136 (66.7)
	Overweight	34 (17)	37 (24.5)	39 (19.1)
	Obesity	2 (1)	6 (4)	10 (4.9)

n represents number of students. BMI: Body mass index.

Table 2 presented the gender and BMI distribution of students across three South Indian states. Female students constitute the majority in Kerala (70.9%) and Karnataka (61%), whereas in Andhra Pradesh, males are slightly more predominant (55.9%). Regarding BMI, the majority of students in all three states fall within the normal category, with the highest proportion seen in Karnataka (78%), followed by Andhra Pradesh (66.7%) and Kerala (60.3%). Kerala has the highest proportion of underweight students (11.3%) and a relatively higher percentage of overweight (24.5%) and obese (4%) individuals compared to Karnataka and Andhra Pradesh. Andhra Pradesh shows a moderate prevalence of overweight (19.1%) and obesity (4.9%). Overall, while most students have normal BMI, Kerala students exhibit greater variation in BMI

categories, and gender distribution patterns vary distinctly across the states.

Table 3 analysed the association between gender and BMI classification among students in all three states using the Chi-square (χ^2) test at 5% level of significance. In Karnataka, although a higher number of females are underweight compared to males (8 vs. 0), the association between gender and BMI is not statistically significant ($\chi^2 = 5.41$, $p = 0.144$). Similarly, in Kerala, more females than males fall into the underweight and overweight categories, but again, the gender difference is not statistically significant ($\chi^2 = 1.797$, $p = 0.616$). However, in Andhra Pradesh, a significant association is observed between gender and BMI ($\chi^2 = 13.29$, $p = 0.004$), with more males in the normal category (88 vs. 48) and more females in the underweight and obese categories. This indicates that gender is significantly related to BMI classification in Andhra Pradesh but not in Karnataka or Kerala.

Table 4 presented a gender-wise distribution of educational qualifications and campus residency among students from three South Indian states. In Karnataka, the majority are undergraduates (68%), with a fairly balanced gender split (61 males, 75 females), and most reside off-campus (59%). Kerala shows greater diversity in educational status, with nearly half (49%) being graduates and a significant number of post-graduates (17.9%). Females dominate in graduate and post-graduate categories, and 72.2% of students reside off-campus. Andhra Pradesh students have the highest proportion of post-graduates (35.3%) and a relatively balanced representation of graduates (34.3%) and under-graduates (29.4%). Unlike the other two states, a majority of Andhra Pradesh students (66.7%) live on campus, with more males than females in this category. Notably, professional degrees are more common among Kerala students (7.3%). Overall, educational attainment and campus residency patterns vary significantly by state and gender, with Kerala showing higher graduate enrolment, Karnataka favouring under-graduate education, and Andhra Pradesh showing a strong post-graduate and on-campus presence.

Table 5 presented a comprehensive gender-wise comparison of stress-induced eating behaviours, coping strategies, and related lifestyle factors among students across Karnataka, Kerala, and Andhra Pradesh, using Pearson's Chi-square

Table 3: Comparative analysis of BMI classification with gender

State	Karnataka				Kerala				Andhra Pradesh			
BMI classification	Male	Female	χ^2	p value	Male	Female	χ^2	p value	Male	Female	χ^2	p value
Under weight	0	8	5.41	0.144	3	14	1.797	0.616	7	12	13.29	0.004
Normal	63	93			26	65			88	48		
Overweight	14	20			13	24			16	23		
Obesity	1	1			2	4			3	7		

BMI: Body mass index, χ^2 : Chi-square, $p < 0.05$ is considered statistically significant.

Table 4: Educational status and residence frequency distribution of students from different

Parameters	Characteristics	Karnataka students n (%)	Male	Female	Kerala students n (%)	Male	Female	Andhra Pradesh students n (%)	Male	Female
Educational status	Diploma	2 (1)	2	0	10 (6.6)	3	8	2 (1)	0	2
	Graduate	3 (1.5)	2	1	74 (49)	27	47	70 (34.3)	45	25
	Post graduate	55 (27.5)	12	43	27 (17.9)	4	23	72 (35.3)	33	39
	Professional degree	4 (2)	1	3	11 (7.3)	3	8	0	0	0
	Under graduate	136 (68)	61	75	29 (18.8)	8	21	60 (29.4)	36	24
Campus	Off campus	118 (59)	51	67	109 (72.2)	36	73	68 (33.3)	39	29
	On campus	82 (41)	27	55	42 (27.8)	8	34	136 (66.7)	75	61

n represents number of students.

test. In Karnataka and Kerala, most variables showed no statistically significant gender differences ($p > 0.05$), except alcohol consumption in Karnataka ($p = 0.005$) and night eating syndrome in Kerala ($p = 0.01$). However, Andhra Pradesh revealed significant gender differences in multiple parameters, including the frequency of eating when stressed ($p \leq 0.0001$), feelings after stress eating ($p \leq 0.0001$), eating habit changes during high stress ($p \leq 0.0001$), beliefs about calming foods ($p \leq 0.0001$), alcohol use ($p \leq 0.0001$), physical activity ($p \leq 0.0001$), diet quality ($p = 0.019$), caffeine use ($p = 0.036$), frequency of eating outside during stress ($p \leq 0.0001$), types of craved foods ($p = 0.011$), alternative coping mechanisms ($p \leq 0.0001$), and emotional responses like anxiety and sadness ($p \leq 0.0001$). Notably, stress eating in response to academic workload, feeling lonely, and emotional states such as anxiety and sadness were significantly more reported among males in Andhra Pradesh. This indicates that students in Andhra Pradesh exhibit more gender-specific variations in stress-related behaviours compared to their counterparts in Karnataka and Kerala.

Table 6 examined gender-wise differences in health-related parameters and stress-associated physiological responses among students in all three states. While food allergies did not show significant gender variation in any state ($p > 0.05$). In Andhra Pradesh, significant gender differences were observed in blood sugar changes during stress ($p \leq 0.0001$), family history of metabolic disorders ($p = 0.041$), biochemical test abnormalities ($p \leq 0.0001$), medication/supplement use ($p = 0.033$), and physical health effects due to stress eating ($p = 0.01$). Karnataka also reported significant differences by gender in family history of metabolic disorders ($p = 0.017$), biochemical abnormalities ($p = 0.042$), and medication/supplement use ($p = 0.001$). Kerala students showed a significant gender difference only in the presence of a family history of metabolic disorders ($p = 0.003$). These findings suggest that gender plays a more pronounced role in how stress and diet affect health among students in Andhra Pradesh and Karnataka, especially regarding physiological responses, diagnostic indicators, and treatment approaches.

Table 5: Comparative analysis of emotional well-being with gender

States		Karnataka				Kerala				Andhra Pradesh			
Parameters	Characteristics	M	F	χ^2	p value	M	F	χ^2	p value	M	F	χ^2	p value
When feeling stressed, how often do you turn to food for comfort?	Frequently	60	89	0.78	0.677	22	56	0.321	0.852	21	43	20.151	$\leq 0.0001^*$
	Never	4	5			2	3			13	7		
	Rarely	14	28			20	48			80	40		
Have you noticed any changes in your eating habits since college?	No	55	83	0.137	0.711	30	74	0.014	0.906	25	28	2.205	0.138
	Yes	23	39			14	33			89	62		
How often do you find yourself eating as a way to cope with stress?	Always	0	3	8.274	0.082	1	2	6.153	0.188	4	5	6.631	0.157
	Never	5	1			0	6			14	9		
	Often	8	13			3	9			15	7		
	Rarely	9	22			6	27			15	23		
	Sometimes	56	83			34	63			66	46		

(Contd...)

States		Karnataka				Kerala				Andhra Pradesh			
Parameters	Characteristics	M	F	χ^2	p value	M	F	χ^2	p value	M	F	χ^2	p value
Do you have night eating syndrome?	No	46	72	0.205	0.903	8	35	9.24	0.01	80	50	4.761	0.093
	Sometime	15	26			16	49			14	18		
	Yes	17	24			20	23			20	22		
Do you feel that online food ordering habits have any impact on your physical health?	No	42	59	0.573	0.449	19	38	0.78	0.377	29	30	1.525	0.217
	Yes	36	63			25	69			85	60		
How do you feel after engaging in stress eating?	Guilty	18	36	1.213	0.545	6	30	6.032	0.049	7	14	21.874	≤0.0001*
	No difference	34	52			16	44			28	43		
	Relived	26	34			22	33			79	33		
Do you notice any changes in your eating habits during times of high stress (e.g., eating more, eating less, craving specific foods)?	No	36	48	0.906	0.341	9	21	0.013	0.908	13	29	13.333	≤0.0001*
	Yes	42	74			35	86			101	61		
Are there any specific foods or beverages that you believe help alleviate your stress or make you feel calmer?	No	30	59	1.888	0.169	16	54	2.494	0.114	20	38	15.053	≤0.0001*
	Yes	48	63			28	53			94	52		
How often do you consume alcohol as a way to relax or unwind during times of stress?	Frequently	17	13	10.775	0.005	2	1	6.914	0.032	50	3	79.943	≤0.0001*
	Never	16	50			30	92			19	69		
	Rarely	45	59			12	14			45	18		
Do you engage in regular physical activity or exercise as a way to cope with stress?	No	38	59	0.002	0.961	24	50	0.762	0.383	30	46	13.228	≤0.0001*
	Yes	40	63			20	57			84	44		
How would you describe your overall diet quality?	Excellent	0	2	3.428	0.33	1	3	3.031	0.387	3	3	9.979	0.019
	Fair	60	81			19	51			44	19		
	Good	10	20			5	21			57	50		
	Poor	8	19			19	32			10	18		
When you feel stressed, do you notice any changes in your appetite or hunger levels?	No	37	49	1.027	0.311	16	33	0.434	0.51	21	27	3.748	0.053
	Yes	41	73			28	74			93	63		
Do you feel that stress eating helps alleviate your stress temporarily	No	34	45	0.895	0.344	12	48	4.027	0.045	49	31	1.538	0.215
	Yes	44	77			32	59			65	59		
Do you consume caffeinated beverages (e.g., coffee, tea, energy drinks) to help cope with stress?	No	29	39	0.576	0.448	10	51	8.052	0.005	31	37	4.384	0.036
	Yes	49	83			34	56			83	53		

(Contd...)

States		Karnataka				Kerala				Andhra Pradesh			
Parameters	Characteristics	M	F	χ^2	<i>p</i> value	M	F	χ^2	<i>p</i> value	M	F	χ^2	<i>p</i> value
Do you notice any changes in your digestion or gastrointestinal symptoms (e.g., bloating, stomach pain) when you're feeling stressed?	No	18	42	2.918	0.088	17	33	0.855	0.355	34	25	0.102	0.749
	Yes	60	80			27	74			80	65		
How often do you eat meals outside during periods of stress?	Frequently	17	19	3.576	0.167	12	5	16.063	≤0.0001*	51	19	15.891	≤0.0001*
	Never	6	4			3	12			6	15		
	Rarely	55	99			29	90			57	56		
Which types of food do you typically crave when feeling stressed?	Bakery products	27	50	2.306	0.511	8	15	2.276	0.517	4	3	11.171	0.011
	Fast food	13	24			20	40			45	54		
	Fruits and vegetables	31	42			6	15			31	10		
	Sugar snacks	7	6			10	37			34	23		
What are the other mechanisms do you use to manage stress aside from eating?	Exercise	8	9	2.436	0.487	7	14	11.538	0.009	49	15	23.28	≤0.0001*
	Meditation	5	9			9	14			13	8		
	Others	32	40			5	42			4	15		
	Talking to friends and family	33	64			23	37			48	52		
what emotions do you typically experience when engaged in stress eating?	Anger	13	15	1.553	0.817	12	19	6.459	0.167	9	22	20.957	≤0.0001*
	Anxiety	4	10			7	28			55	19		
	Boredom	10	14			13	25			11	8		
	Loneliness	33	51			6	8			16	17		
	Sadness	18	32			6	27			23	24		
How likely are you to engage in stress eating during the following situations?	After receiving bad news	12	12	15.999	0.067	8	13	10.379	0.168	7	8	75.904	≤0.0001*
	Academic workload	4	15			4	16			45	0		
	Family problems	2	8			0	0			5	20		
	Financial stress	14	8			14	23			15	12		
	Health concern	2	1			1	13			0	7		
	Relationship issues	11	12			9	16			4	1		
	Social pressure	14	22			2	16			9	23		
	Family pressure	0	1			0	0			0	0		
	Before exams	5	17			3	4			25	10		
	Feeling lonely	14	26			3	6			4	9		
M: Male, F: Female , χ^2 : Chi-square. <i>p</i> <0.05 is considered statistically significant													

Table 6: Comparison of medical health with gender

States		Karnataka				Kerala				Andhra Pradesh			
Parameters	Characteristics	M	F	χ^2	<i>p</i> value	M	F	χ^2	<i>p</i> value	M	F	χ^2	<i>p</i> value
Do you have any food allergies or intolerances?	No	41	78	2.553	0.11	35	90	0.456	0.499	66	59	1.244	0.265
	Yes	37	44			9	17			48	31		
Have you ever experienced changes in your blood sugar levels during or after stressful situations?	No	35	53	2.305	0.316	17	46	1.367	0.505	78	39	22.02	≤0.0001*
	Not Sure	18	39			20	51			10	31		
	Yes	25	30			7	10			26	20		
Do you have a family history of metabolic disorders (e.g., diabetes, obesity)?	No	27	67	8.134	0.017	6	1	11.637	0.003	42	46	4.175	0.041
	Not Sure	20	19			20	61			0	0		
	Yes	31	36			18	45			72	44		
Have you ever undergone biochemical tests (e.g., blood glucose levels, lipid profile) and noticed any abnormalities related to stress or dietary habits?	No	44	86	4.147	0.042	36	86	0.042	0.838	105	64	15.596	≤0.0001*
	Yes	34	36			8	21			9	26		
Are you currently using any medications or supplements to manage stress or appetite?	No	44	95	10.336	0.001	42	101	0.07	0.791	101	87	4.532	0.033
	Yes	34	27			2	6			13	3		
Have you experienced any negative effects on your physical health as result of stress eating? (Eg. Weight gain, weight loss, digestive issues)	No	42	73	0.699	0.403	24	42	2.964	0.085	44	51	6.6	0.01
	Yes	36	49			20	65			70	39		

M: Male, F: Female, χ^2 : Chi-square. *p* < 0.05 is considered statistically significant

DISCUSSION

The present study evaluated gender-based differences in stress-induced eating behaviours and their associated health implications among college students from Karnataka, Kerala, and Andhra Pradesh. The findings revealed notable regional and gender variations in emotional eating patterns, coping behaviours, and health-related outcomes. Female students from Karnataka and Kerala reported greater tendencies toward emotional eating, whereas male students in Andhra Pradesh demonstrated more pronounced behavioural changes during stressful situations.

These findings are consistent with previous research indicating that psychological stress significantly influences dietary behaviour among university students. Several studies have reported that a substantial proportion of students engage in emotional eating when experiencing academic or personal stress, with higher prevalence among female students due to differences in coping mechanisms and psychosocial factors.^[1,8]

Emotional eating has been linked with increased consumption of high-calorie and energy-dense foods, which may contribute to adverse physical and metabolic health outcomes over time.

^[4,5] Stress-related changes in appetite, food cravings, and eating frequency observed in the present study support earlier findings that psychological stress can alter eating patterns and dietary quality among young adults.^[3,4]

The study also identified significant gender differences in several behavioural and physiological parameters among students from Andhra Pradesh. Previous research suggests that environmental factors, lifestyle habits, and academic workload may influence stress perception and coping behaviours among college students.^[6,12] These relative factors may explain the regional differences observed in stress-related eating behaviours and health indicators in the present study. Overall, the findings emphasise the importance of promoting stress management strategies and healthy dietary habits among college students. Implementing gender-sensitive and region-specific interventions may help reduce unhealthy

coping behaviours and improve emotional well-being in this population.

Limitation

A key limitation of the present study is that socio-economic status was not assessed. Since socio-economic factors can significantly influence both stress patterns and eating behaviours among students, the lack of this information may limit the generalisability of our findings.

CONCLUSION

The present study highlights notable differences influenced by gender in the eating habits of college students from Karnataka, Kerala, and Andhra Pradesh in relation to stress. Though the majority of the students acknowledged emotional and behavioural changes and a shift in eating habits during periods of stress, the changes were more intense among females from Kerala and Karnataka and males from Andhra Pradesh. The findings also showed that students from Andhra Pradesh had more significant stress-related behaviours along with health outcomes such as weight classification and functioning symptom clusters, including physical symptoms and coping strategies. This study draws attention to the significant influence of gender, psychological stress, and food habits in relation to the health of young adults. This also highlights the necessity of region-specific and gender-sensitive policies for the enhancement of emotional health and rational eating habits among college students. Further investigations could employ longitudinal methods with objective measurements of stress and eating habits for effective intervention and preventive policy development.

Ethical approval: The research/study approved by the Institutional Review Board at JSS Medical College, number JSSMC/IEC/130624/2BNCT/2024-2025, dated 13th June 2024.

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