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Original Research Article

TREND OF NUTRITIONAL STATUS AMONG FAMILIES ALLOTTED TO UNDERGRADUATE MEDICAL STUDENTS OF TERTIARY CARE HOSPITAL IN INDIA.

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ABSTRACT

Background: The problem of Malnutrition, defined as a pathological state resulting from an absolute or relative deficiency or excess of one or more essential nutrients, remains a public health problem since many years. Out of the four categories of malnutrition, the over nutrition is also rising on an alarming stage. In our country Chandigarh is fourth richest state/Union Territory (UT) amongst Indian states/UTs as classified by economic status. The aim of the study, therefore, was to find out the prevalence of overnutrition (overweight and obesity) over the years in the form of trends amongst the families of medical undergraduate students at GMCH- 32 Chandigarh.

Materials and Methods: This cross-sectional study was conducted over a year at Adichunchanagiri The practical note-book (manual) in which students are supposed to write the details of their own families are frequently checked by demonstrators in the field itself. The nutritional status was measured by calculating body mass index (BMI). It was compared with the data from previous records and data from national family health survey (NFHS) -5. From a sub sample the average per capita income of the families was calculated.

Results: Across three block years of 2000-2004(I), 2005-2008(II) and 2015-2019(III), overweight among males first decreased from 32.4% in block year I to 28% in block year II and then increased to 37.7% in block year III. In case of females, however, the overweight increased continuously through all three block years, from 24.4% to 30.1% to 33.3%. The reverse was true for obesity. Obesity increased constantly for all three block years in males but in case of females there was slight decrease from block I to II. The overnutrition (overweight + obesity), for males decreased slightly from 35% in the block year 2000-2004 to 34% in block year 2005-2008 and than increased sharply to 45.1% in the block year 2015-2019. The similar figures for females were 30.7%, 36% and 43.9% for the same block years respectively. However, there was only little increase in block years 2000-2004 to 2005-2008.

Conclusion: Thus, we see that there has been an eventual increase in overweight, obesity and overnutrition among both genders over the years.

Keywords: Nutritional status, overweight, obesity, Trends, Families, Undergraduates.

INTRODUCTION

Malnutrition, encompassing undernutrition, overnutrition, and micronutrient deficiencies, persists as a formidable global public health challenge, with India exemplifying its multifaceted burden. The Global Nutrition Report (GNR) 2021 underscores the failure to meet the World Health Organization's (WHO) sixth nutritional target—

halting the rise in obesity and reducing diabetes prevalence—with global obesity rates reaching 6.2% among females and 3.2% among males aged over 18 years.[1] In India, overnutrition, including overweight and obesity, is escalating rapidly alongside persistent undernutrition, reflecting a nutrition transition driven by urbanization, economic growth, and shifting dietary patterns.[2] Chandigarh, a Union Territory ranked fourth among Indian states and Union Territories (UTs) by economic status, epitomizes this trend. Data from the National Family Health Survey (NFHS-5, 2019-21) reveal that Chandigarh's mean body mass index (BMI) among adults aged 15-49 years exceeds the national average, with a marked increase from NFHS-3 (2005-06) to NFHS-5.[3] Notably, NFHS-3 identified Sikh females in Chandigarh as disproportionately obese, a finding significant given the city's elevated Sikh population relative to national figures.[4] As the joint capital of Punjab—a state with high overweight prevalence alongside Delhi and Karnataka—Chandigarh shares cultural and dietary influences that may exacerbate overnutrition.[3] Lifestyle factors, such as alcohol use (0.3% among females, 18.6% among males) and tobacco consumption (0.6% among females, 12.1% among males) reported in NFHS-5, further compound nutritional risks.[3] Medical institutions, pivotal in training future healthcare professionals, offer a unique platform for addressing this dual burden through targeted interventions.[5] This study investigates the prevalence of overnutrition among families of undergraduate medical students at a tertiary care hospital in Chandigarh, leveraging their potential as health educators to mitigate this growing epidemic, which aligns with broader national trends documented by Swaminathan et al.[20]

MATERIALS AND METHODS

This cross sectional, descriptive study was conducted among families of Field Practice area under RHTC of GMCH-32 Chandigarh, Duration of study was May 2024 to July 2024

Study sample: Tt was a secondary data based study, where records of practical manual/notebook of undergraduate from year 2000 to 2019 were analyzed.

Data collection & Analysis

There are several resources on nutrition data like Access to Nutrition Index, Anemia Mukt Bharat, Bookings India Health Monitor, Champions of Change, Countdown to 2030 (CD2030), e-Library of Evidence for Nutrition Actions(eLENA), Jan Andolan Dashboard(POSHAN Abhiyan), Leveraging Agriculture for Nutrition in South Asia (LANSA), NITI Ayog State Nutrition Dasboard,Nutrition Atlas, Nutrition India, Tata NIN Centre of Excellence in Public Health Nutrition. All of these have certain inherent drawbacks. Hence we used data from the source (practical notebook/ manual) which was supervised by ourselves i.e secondary data regarding students and their family members of Palsora village, chandigarh. The students who did not complete record were excluded.

To impart the health education to the families, each medical student is supposed to know the health status (with an emphasis on nutritional health) of each individual of family including students themselves. The manual in which students are supposed to write the details of family are frequently checked by demonstrators in the field itself. The nutritional status was measured by calculating body mass index (BMI) from the measurements of height and weight recorded by students. The individuals with BMI less than 20 were considered as undernourished, 20-44.9 as optimally nourished and those with BMI equal to or more than 25 as overweight with its further classification to overweight (25 to 29.9) and obese (30 and more). Weight was measured by using calibrated electronic scale (CAMRY) with a range of 25-150kg and accuracy of 0.5kg. Height was measured by stadiometer with nearest centimeter. It was compared with the data from previous records and from National Family Health Survey-5. Data was recorded separately for males and females. From a sub sample the average per capita income of the families was calculated.

Statistical Analysis: Proportions, chi-square test & P value was calculated to interpret the results along with their significance.

RESULTS

This cross-sectional study evaluated the nutritional status of 391 family members of undergraduate medical students affiliated with a tertiary care hospital in Chandigarh's Palsora village. The cohort comprised 202 males (51.7%) and 189 females (48.3%). Gender-specific demographic characteristics revealed significant differences in age distribution ($\chi^2 = 29.04$, df = 4, $p < 0.001$), with males predominantly aged 20-24 years (25.7%) and 50-59 years (25.7%), and females concentrated in the 25-49 years group (42.9%). Educational attainment also varied significantly ($\chi^2 = 26.19$, df = 3, $p < 0.0001$), with 43.1% of males and 49.2% of females having less than a graduate education, while 18.0% of females versus 6.4% of males held postgraduate degrees. Religious composition showed no significant gender difference ($\chi^2 = 0.345$, df = 1, $p = 0.557$), with 79.0% Hindu and 21.0% Sikh or other faiths, aligning with Chandigarh's higher-than-national Sikh demographic.[3]

Table 1: Gender wise distribution of some characteristics of study population (N=391)

	Male N (%)	Female N (%)	Total N (%)	Statistics
Age				
Less than 19	39 (19.3)	16 (8.5)	55 (14.1)	
20-24	52 (25.7)	54 (28.6)	106 (27.1)	
25-49	45 (22.3)	81 (42.9)	126 (32.2)	X2 = 29.04
50-59	52 (25.7)	25 (13.2)	77 (19.7)	df=4
60+	14 (6.9)	13 (6.9)	27 (6.9)	P value < 0.001
Education				
Less than	87 (43.1)	93 (49.2)	180 (46.0)	
Graduate	59 (29.2)	22 (11.6)	81 (20.7)	
Post Graduate	13 (6.4)	34 (18.0)	47 (12.0)	X2= 26.19
Professional	43 (21.3)	40 (21.2)	83 (21.2)	df=03
				P value< 0.0001
Religion				X2=0.345
Hindu	162(80.2)	147(77.8)	309 (79.0)	df=1
Sikh & other religion	40(19.8)	42(22.2)	82 (21.0)	P= 0.556905
Total	202(100)	189(100)	391 (100)	

Table- 2 illustrates the trend of nutritional status across three block years—2000–2004 (n = 970), 2005–2008 (n = 277), and 2015–2019 (n = 391)—derived from secondary data in students' practical manuals. Nutritional status, classified by BMI as under-nutrition (<20), optimum nutrition (20–24.9), over-nutrition (25–29.9), and obesity (≥30), shifted significantly over time (χ^2 = 42.21, df = 6, p < 0.001). Under-nutrition decreased from 15.5% in 2000–2004 to 5.4% in 2015–2019, while overnutrition (overweight) rose from 28.6% to 35.6%, and obesity increased from 4.3% to 8.9%. Combining overnutrition and obesity, the prevalence of overnutrition increased from 32.9% to 44.5% over the study period. Optimum nutrition remained relatively stable (51.6% to 47.2% to 50.1%).

Table 2: Distribution of nutritional status during different block years

Nutritional status	2000-2004 N (%)	2005-2008 N (%)	2015-2019 N (%)	Statistics
Under Nutrition	150 (15.5)	50 (18.1)	21 (5.4)	X2=42.21 df=6 P<0.001
Over Nutrition	277 (28.6)	80 (28.9)	139 (35.6)	
Obesity	42 (4.3)	16 (5.8)	35 (8.9)	
Optimum Nutrition	501 (51.6)	131 (47.2)	196 (50.1)	
Total	970(100)	277 (100)	391 (100)	

Table 3 details gender-wise nutritional status. In 2000–2004, significant gender differences were observed (χ^2 = 30.27, df = 3, p < 0.0001), with females showing higher under-nutrition (20.7% vs. 10.7% in males) and obesity (6.3% vs. 2.6% in males), while males had greater over-nutrition (32.4% vs. 24.4%). Total overnutrition (overweight + obesity) was 38.7% in males and 30.7% in females. By 2005–2008, gender differences were non-significant (χ^2 = 0.26, df = 3, p = 0.9666), with overnutrition at 28.0% (males) and 30.1% (females), and obesity at 6.0% (males) and 5.7% (females). In 2015–2019, gender differences remained non-significant (χ^2 = 1.73, df = 3, p = 0.6300), with overnutrition at 37.7% (males) and 33.3% (females), and obesity at 7.4% (males) and 10.6% (females), yielding total overnutrition of 45.1% in males and 43.9% in females. A subsample analysis indicated an average per capita income of INR 15,000/month.

Table 3: Gender wise distribution of nutritional status during different block years

	2000-2004 (n=970)		2005-2008 (n=277)		2015-2019 (n=391)	
Nutritional status	**Male N (%)**	**Female N (%)**	**Male N (%)**	**Female N (%)**	**Male N (%)**	**Female N (%)**
Under Nutrition	54 (10.7)	96 (20.7)	29 (17.4)	21 (18.5)	10 (5.0)	11 (5.8)
Over Nutrition	164 (32.4)	113 (24.4)	46 (28.0)	34 (30.1)	76 (37.7)	63 (33.3)
Obesity	13 (2.6)	29 (6.3)	10 (6.0)	6 (5.7)	15 (7.4)	20 (10.6)
Optimum Nutrition	275 (54.3)	226 (48.7)	79 (48.2)	52 (46.0)	101 (50.0)	95 (50.0)
Statistics	X2=30.27 df=3 P<0.0001		X2= 0.26 df=3 P=0.9666		X2=1.73 df=3 P=0.6300	

DISCUSSIONS

This study illuminates the evolving nutritional landscape among families of undergraduate medical students in Chandigarh, reflecting India's broader epidemiological transition. The significant rise in overnutrition—from 32.9% in 2000-2004 to 44.5% in 2015-2019—parallels the GNR 2021's observation of unmet global obesity targets,[1] and corroborates NFHS-5 data showing Chandigarh's elevated BMI relative to national averages.[3] This

trend aligns with Misra et al.'s documentation of India's nutrition transition, driven by energy-dense diets and sedentary lifestyles, particularly in urban settings,[2] and is further evidenced by the National Nutrition Monitoring Bureau Survey findings on adult nutritional status.[20] The 44.5% overnutrition prevalence in 2015-2019 exceeds NFHS-5 estimates for Chandigarh adults aged 15-49 years, potentially reflecting the cohort's proximity to a tertiary care hospital and Punjab's obesogenic cultural dietary patterns.[3] Moreover, this escalation mirrors the global nutrition transition described by Popkin et al., highlighting the pandemic of obesity in developing countries.[21]

Gender-specific findings reveal a complex interplay of sociocultural and behavioral factors. The early disparity in obesity—6.3% among females versus 2.6% among males in 2000-2004—echoes NFHS-3's report of profound obesity among Sikh females, possibly linked to food allocation disparities and reduced physical activity in urban women.[4,6,7] By 2015-2019, obesity rose to 10.6% in females and 7.4% in males, surpassing GNR 2021 global estimates (6.2% and 3.2%, respectively).[1] This convergence in overnutrition (45.1% males, 43.9% females) may indicate the influence of health education from medical students, as suggested by Dandona et al.'s urban health improvements.[8] Meanwhile, the decline in undernutrition from 15.5% to 5.4% mirrors NFHS-5's reported 8.4% underweight prevalence in Chandigarh, reflecting the success of initiatives like the National Nutrition Mission.[3,19] These trends are consistent with forecasts by Luhar et al., predicting a sustained rise in overweight and obesity in India through 2040,[22] and systematic reviews by Ahirwar and Mondal documenting the increasing obesity burden.[23]

Demographic and socioeconomic factors further contextualize these trends. The predominance of females aged 25-49 years ($p < 0.001$) highlights a group often responsible for family nutrition, yet vulnerable to obesogenic stressors.[9] Educational disparities ($p < 0.0001$), with nearly half below graduate level, underscore limited nutritional literacy, a known determinant of health outcomes.[10] Lifestyle factors from NFHS-5, including higher male alcohol (18.6%) and tobacco use (12.1%) versus females (0.3% and 0.6%), may exacerbate male overnutrition.[3] Chandigarh's middle-income status likely facilitates access to processed foods, amplifying risks identified by Popkin.[5]

The study's strengths include its use of calibrated BMI measurements and focus on a medical education-linked cohort, enhancing intervention potential.[12,13] However, limitations—such as the absence of dietary or detailed income data, a reduced sample size (970 to 391), and a cross-sectional design—preclude causal inference and longitudinal insights.[14,15] Nonetheless, these findings underscore the need for targeted interventions addressing India's dual malnutrition burden, leveraging medical training environments to curb overnutrition while sustaining undernutrition gains, as supported by national data,[20] and predictive models.[22]

CONCLUSION

This study delineates a striking nutritional shift among families of undergraduate medical students in Chandigarh, with overnutrition surging from 32.9% to 44.5% over nearly two decades, outpacing global benchmarks and reflecting India's urban transition as documented by Swaminathan et al,[20] and Popkin et al.[21] Concurrently, undernutrition's decline from 15.5% to 5.4% signals progress, yet the rising obesity burden—particularly among women—poses a formidable public health challenge, consistent with forecasts by Luhar et al,[22] and reviews by Ahirwar and Mondal.[23] Medical colleges emerge as strategic hubs for prevention, harnessing students' potential to bridge health disparities. Addressing this dual burden demands integrated policies: bolstering undernutrition programs like Poshan Abhiyaan while implementing robust overnutrition strategies—taxation on processed foods, physical activity promotion, and gender-tailored interventions. Enhanced surveillance and research will further refine these efforts, ensuring a balanced response to India's evolving nutritional landscape.

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