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## **Evaluation of Nutritional Status Among School-Going Adolescents**

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**KEYWORDS** 

B.D.,

P.A.

Overwt,

0,

nutri.S.

Α.

#### ABSTRACT:

Studies show that Overwt and O have reached pandemic proportions, making this generation the first with a predicted life expectancy lower than their parents. Our study evaluated the nutri.S of school-aged A. RSSS,SPTCK& NMPS were randomly selected by lottery for our study with 700 A in total. We excluded kids who were absent on data collection day. Student data was acquired through a questionnaire and an interview. Our questionnaire has three sections:P&SDG character, D&L-RF and APM of A. We found that 16% of overwt and O A showed a positive F h/o of NCD as (p > 0.05) thus,not statistically significant. The frequency of overwt and O was also found to be higher in A who used motorized transport (39, 18.6%) than in A who cycled or walked to school (75, 15.3%).Therefore, we must employ a broader approach to assessing nutrition S to A and prioritize efforts to address both over- and under-nutrition with HE and SHP to emphasize the importance of a B.D. and P.A.

#### **INTRODUCTION**

Various studies have been determining that the term "adolescents"(A) refers to those in the age range of 10 to 19 years.<sup>1</sup> Researchers also concluded that the global teenage population exceeds 1.2 billion individuals.<sup>1</sup> In addition to above context, studies have reached the consensus that around 21% of the Indian population, amounting to approximately 243 million individuals, consists of A.<sup>2</sup> Thus, according to many studies, this figure positions India as the country with the biggest A population globally.<sup>2</sup> Studies have also shown that, A was a nutritionally (nutr.) vulnerable time that calls for close supervision, making it a difficult period for nutritionists.<sup>3</sup> Researchers also concluded that both under-nutr. and micro-nutr. Mal-nutri., as well as obesity were most common problems of A.<sup>3</sup> Studies have been concluding that rapid physical, mental, sociopsychological, and sexual growth are all hallmarks of this period.<sup>4</sup> Additionally, studies have also concluded that

during this period, somatic growth (SOG) accounts for 40–50% of a person's total body weight and more than 20% of their total stature growth(SG).<sup>4</sup> Furthermore, nutri. Status(S) of A girls, who are the future mothers, bears special significance as they contribute significantly to the nutri.S of the community as a whole.<sup>5</sup> Henceforth, the goal of our study was to assess and evaluate the nutri. S of school-going A.

#### AIM

To evaluate and assess nurti.S for A.

#### **INCLUSION CRITERIA**

- 1. Children of 10-15 years of age.
- 2. Both male & female students were involved.

#### **EXCLUSION CRITERIA**

Students above the age of 15 and below 10 years

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#### **MATERIAL & METHOD**

We have conducted a school-based cross-sectional study in the department of community medicine at KIMS, Karad, starting in October 2017 and ending in October 2019 after taking written informed consent. In our study, we have randomly selected by lottery three different schools named "Rotary Shikshan Sanstha School (RSSS), Shri Pramila Tai Chavan Kanyashala (SPTCK), and Nuthan Marathi Primary School (NMPS)". In addition to this, RSSS (standard 7th to 9th grade students i.e. 195 A), SPTCK (7th to 9th grade students ie. 274 A), and NMPS (5th to 9th grade students i.e. 231 A) thus, 700 A in total were included in our research. In this, those students who were absent on the day of data collection were not included. We have collected data from students in the form of a questionnaire study by interview method. Our questionnaire format includes 3 sections, i.e., personal and socio-demographic (P&SDG) character, dietary and lifestyle (D&L) related risk factors (RF), and lastly, anthropometric measurement (APM) of A, respectively. Here, P-SDG contains subheadings like age, sex, father (FE) and mother education (ME), occupation (O), number of members in the family (n

#### RESULT

MOF), birth order (BO), number of brothers and sisters (n B&S), total income (TI), SES, type of house TOH), number of rooms( nR), fuel for cooking(FOC), and storage of food (SOF). D included type of diet, number of meals consumed every day (n MCD), skipping meals (SOM), consumption of snacks between meals (COS-M), consumption of fast food (FF), carbonated drinks (CD), and consumption of fruit and vegetables ( COF &V). And L includes hours on TV, hours on a computer, mobile device, or gadget, the presence of physical activity (PA) before school hours, mode of transport to school (MOT), hours of sleep, and time between dinner ,sleep and any family h/o for overweight & obesity. Lastly, APM includes wt, ht, waist (wst) circumference (CF), hip CF,BMI, wst-ht ratio(R) & wst-hip R.

## STATISTICAL ANALYSIS

We have entered our data in microsoft excel 2016 & analysed using SPSS version 20 .Mean & standard devition was obtained using chi-square to assess the qualitative data. Multivariate analysis was carried out to determine the odds of RF for OW & obesity.If p value of <0.05 was obtained , result was considered as statistically significant.

Age (In	Male	Female	Total
completed years)	n (%)	n (%)	n (%)
10	20 (7.2%)	26 (6.1%)	46 (6.6%)
11	36 (13%)	48 (11.3%)	84 (12.0%)
12	34 (12.3%)	59 (13.9%)	93 (13.3%)
13	66 (23.8%)	111 (26.2%)	177 (25.3%)
14	78 (28.2%)	99 (23.4%)	177 (25.3%)
15	43 (15.5%)	80 (18.9%)	123 (17.6%)
Total	277 (100%)	423 (100%)	700 (100.0%)

Table 1: Age & gender wise distribution

In our study, we found that, the mean age of the adolescents was found to be  $13.03 \pm 1.5$  years. The mean age of males was  $13 \pm 1.48$  years, and that of females was  $13.06 \pm 1.46$  years. Of the total 700 adolescents, the maximum number of study participants were females (423, or 60.5%), followed by males (277, or 39.5%). The age-wise distribution showed that the maximum number of adolescents belonged to 13 and 14 years 177 (25.3%)

 $\chi^2$ =4.002, df-5, p value>0.05

in each age group, followed by 15 years 123 (17.6%), 12 years 93 (13.3%), and 11 years 84 (12%), while the minimum were in 10 years 46 (6.6%). Amongst males, the maximum number of adolescents belonged to 14 years 78 (28.2%), followed by 13 years 66 (23.8%), 15 years 43 (15.5%), 11 years 36 (13%), 12 years 34 (12.3%), and the least in 10 years 20 (7.2%). Amongst females, the maximum number of adolescents belonged to 13 years 111 (26.2%), followed by 14 years 99

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(23.4%), 15 years 80 (18.9%), 12 years 59 (13.9%), 11 years 48 (11.3%), and the least in 10 years 26 (6.1%). There is no statistically significant difference in the age and gender-wise distribution of the study population (p > 0.05) (Table 1).

	Frequency
SES	
status	n (%)
Upper	56 (8%)
Middle	382 (54.6%)
Lower	262 (37.4%)
Total	700 (100%)

#### Table 2: SES

In our study, we found that, the maximum number of adolescents belonged to middle class 382 (54.6%), followed by lower class 262 (37.4%), and the minimum were in upper class 56 (8%) (Table 2).

Housing a	Frequency n (%)	
Type of house         Kuccha(K)		152 (21.7%)
( <b>n=700</b> )	Pucca (P)	548 (78.3%)
Sanitary Latrine	Own	531 (75.9%)
( <b>n=700</b> )	Public Latrine (PL)	169 (24.1%)
	LPG	561 (80.1%)
Cooking	Chulha(C)	14 (2%)
( <b>n=700</b> )	Both	125 (17.9%)
Food storage	Open	56 (9%)
( <b>n=700</b> )	Covered	644 (92%)

Table 3: H&S

In our study, we found that, the maximum number of A lived in a P house: 548 (78.3%), while 152 (21.7%) lived in a K house. PL was used by 169 (24.1%) A, while 531 (75.9%) had their own L facilities. LPG was used for

cooking in the majority of households (561 (80.1%), LPG and C by 125 (17.9%), and C by 14 (2%). Food was left open by 56 (9%) households, while 644 (92%) covered the food (Table 3).

Age (In completed years)	Mean and standard deviation of weight (in Kg)	Mean and standard deviation of height (in cm)	Mean and standard deviation of BMI (in Kg/m²)	Total	
10	$28.6\pm5.13$	$137.48\pm 6$	$15 \pm 2.25$	46	
11	$32.1 \pm 8.5$	$141.8\pm8$	$15.8\pm2.9$	84	
12	$35.4 \pm 8.23$	$146.44\pm7$	$16.4 \pm 2.9$	93	
13	$40.5 \pm 9$	$151.88\pm7$	$17.3 \pm 3.5$	177	
14	$43.3\pm10$	$154.72\pm8$	18 ± 3.3	177	
15	$45.4\pm9.5$	$155.93\pm8$	$18.6\pm3.3$	123	
Total	$39.6 \pm 10.4$	$150.4 \pm 9.7$	$17.2 \pm 3.4$	700	

Table 4: Age & ht, wt, BMI

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In our study, we found that, the mean wt, ht, and BMI of the A were found to be  $39.6 \pm 10.4$  kg,  $150.4 \pm 9.7$  cm, and  $17.2 \pm 3.4$  kg/m2, respectively. The mean wt was the minimum in 10 years ( $28.6 \pm 5.13$ kg) and the maximum was at 15 years ( $45.4 \pm 9.5$ kg). There was a positive correlation between an increase in age and wt. The mean ht was at its minimum at 10 years ( $137.48 \pm 6$  cm), followed by a gradual increase, and reached its maximum at 15 years (155.93  $\pm$  8 cm). There was a positive correlation between age and ht. The mean BMI also showed an increasing trend with age, with a minimum at 10 years (15  $\pm$  2.25) and a maximum at 15 years (18.6  $\pm$ 3.3). BMI also showed a positive correlation with age (Table 4).

Age (In completed years)	Normal n (%)	Thinness n (%)	Overweight n (%)	Obese n (%)	Total n (%)
10	35 (7.5%)	6 (5%)	4 (4.4%)	1 (4.2%)	46 (6.6%)
11	51 (10.9%)	18 (15%)	12 (13.3%)	3 (12.5%)	8 (12%)
12	56 (12%)	23 (19.2%)	11 (12.2%)	3 (12.5%)	93 (13.3%)
13	116 (24.9%)	32 (26.7%)	24 (26.7%)	5 (20.8%)	177 (25.3%)
14	121 (26%)	27 (22.5%)	21 (23.3%)	8 (33.3%)	177 (25.3%)
15	87 (18.7%)	14 (11.7%)	18 (20%)	4 (16.7%)	123 (17.6%)
Total	466 (100%)	120 (100%)	90 (100%)	24 (100%)	700 (100%)

 $\chi^2 = 11.748$ , df-5, p value>0.05

In our study, we found that, among overwt people, the maximum belonged to 13 years 24 (26.7%), followed by 14 years 21 (23.3%), 15 years 18 (20%), 11 years 12 (13.3%), and the least in 10 years 4 (4.4%). The age-wise distribution of obesity showed that maximum obesity was in 14 years 8 (33.3%), followed by 13 years 5 (20.8%), 15 years 4 (16.7%), 11 and 12 years 3 (12.5%) each, and the least in 10 years 1 (4.2%). Thus, there was no age-wise increasing or decreasing trend in the prevalence of overwt and obesity. Further, out of the total

**Table 5:Mal-nuti.** 700 A.

700 A, 466 (66.6%) adolescents had a normal BMI. Normal BMI was maximum in 14 years 121 (26%), while the least was in 10 years 35 (7.5%). The prevalence of thinness was 120 (17.1%). Age-wise distribution showed that maximum thinness was in 13 years 32 (26.7%), followed by 14 years 27 (22.5%), 12 years 23 (19.2%), 11 years 18 (15%), and 15 years 14 (11.7%), and the minimum belonged to 10 years 6 (5%). There was no statistical significance in the age-wise prevalence of malnutrition in adolescents (p > 0.05) (Table 5).

	Normal	Thinness	Overweight	Obese	Total
Gender	n (%)	n (%)	n (%)	n (%)	n (%)
Male	186 (39.92%)	42 (35%)	33 (36.66%)	16 (66.66%)	277 (39.57%)
Female	280 (60.08%)	78 (65%)	57 (63.33%)	8 (33.33%)	423 (60.42%)
Total	466 (100%)	120 (100%)	90 (100%)	24 (100%)	700 (100%)

Table 6: Gender-wise

## $\chi^2$ =8.758, df-3 p value-0.033

In our study we have found that, there was a female preponderance in overwt 57 (63.33%) in comparison to males 33 (36.66%). However, in obesity there was a reversal with males 16 (66.66%) having a higher prevalence than females 8 (33.33%). The overall

prevalence of overwt and obesity was however higher amongst females 65 (57%) than in males 49 (42.9%). Thinness also showed an increased prevalence in females 78 (18.4%) when compared to males 42 (15.2%). This gender-based difference in the nutritional status was found to be statistically significant p<0.05 (Table 6).

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Gender	WHO 2007 BMI reference			Regional BMI standards 2015				
	Normal	Thinness	Overweight	Obesity	Normal	Thinness	Overweight	Obese
	128	112	21	16	204	29	28	16
Male	(46.00())			(5.00())		(10.50())	(10,10())	(5.00())
	(46.2%)	(40.4%)	(7.6%)	(5.8%)	(73.6%)	(10.5%)	(10.1%)	(5.8%)
	230	153	27	13	299	42	49	33
Female								
	(54.4%)	(36.2%)	(6.4%)	(3.1%)	(70.7%)	(9.9%)	(11.6%)	(7.8%)
	358	265	48	29	503	71	77	49
Total								
	(51.1%)	(37.9%)	(6.9%)	(4.1%)	(71.9%)	(10.1%)	(11.0%)	(7.0%)
	$\gamma^2 = 6.287$ , df-3, p value-0.098			$\gamma^2 = 1.56$ . df-3 p value-0.667				

#### Table 7: BMI

In our study, we found that the prevalence of normal BMI was 358 (51.1%) lower using the WHO reference in comparison to the regional standards of 503 (71.9%). The prevalence of thinness was higher with WHO reference 265 (37.9%) when compared to the regional

standards 71 (10.1%). However, the prevalence of overweight 77 (11.0%) and obesity 49 (7%) was higher with regional standards when compared with WHO 48 (6.9%) and 29 (4.1%), respectively (Table 7).

Age (In completed years)	Mean and SD of waist circumference (in cm)	Normal n (%)	Prevalence of central obesity n (%)	Total n (%)
10	$60 \pm 7.2$	42 (6.5%)	4 (8.2%)	46 (6.6%)
11	$61 \pm 9.1$	73 (11.2%)	11 (22.4%)	84 (12%)
12	$62 \pm 8.5$	90 (13.8%)	3 (6.1%)	93 (13.3%)
13	$65.3\pm9.3$	163 (25%)	14 (28.6%)	177 (25.3%)
14	$66.3 \pm 9.3$	167 (25.7%)	10 (20.4%)	177 (25.3%)
15	$67.2\pm8.5$	116 (17.8%)	7 (14.3%)	123 (17.6%)
Total	$64.64 \pm 9.3$	651 (100%)	49 (100%)	700 (100%)

Table 8: Obesity on wst C

## $\chi^2$ =8.076, df-5, p value-0.152

In our study, we found that the wst C gradually increased with age, with a minimum of  $60 \pm 7.2$ cm in 10 years and a maximum of  $67.2 \pm 8.5$ cm in 15 years. Maximum prevalence was observed in 13 years 14 (28.6%), followed by 11 years 11 (22.4%), 14 years 10 (20.4%),

15 years 7 (14.3%), and 10 years 4 (8.2%), while the minimum was in 12 years 3 (6.1%). There was no statistically significant difference in the age-wise prevalence of central obesity using WC. (p>0.05) (Table 8).

Age (In	Normal	Normal Central obesity	
completed years)	n (%)	n (%)	n (%)
10	37 (6.23%)	9 (8.41%)	46 (100.0%)
11	60 (10.11%)	24 (22.42%)	84 (100.0%)
12	81 (13.65%)	12 (11.2%)	93 (100.0%)
13	144 (24.28%)	33 (30.8%)	177 (100.0%)
14	161 (27.15%)	16 (14.95%)	177 (100.0%)
15	110 (18.54%)	13 (12.14%)	123 (100.0%)
Total	593 (100%)	107 (100%)	700 (100.0%)

Table 9: wst hip R

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## $\chi^2$ =21.496, df=5, p value=0.001

In our study, we found that abdominal obesity (AO) was a much more dangerous component in comparison to total obesity. The prevalence of abdominal obesity was highest with a wst-hip ratio of 107 (15.3%), followed by a waist-height ratio of 74 (10.6%), and lowest with a wst C of 49 (7.0%) (Table 9).

Age (In completed years)	Normal n (%)	Stunting n (%)	Total n (%)
10	45 (6.8%)	1 (2.6%)	46 (6.6%)
11	79 (11.9%)	5 (13.2%)	84 (12.0%)
12	89 (13.4%)	4 (10.5%)	93 (13.3%)
13	170 (25.7%)	7 (18.4%)	177 (25.3%)
14	168 (25.4%)	9 (23.7%)	177 (25.3%)
15	111 (16.8%)	12 (31.6%)	123 (17.6%)
Total	662 (100%)	38 (100%)	700 (100.0%)
	Table 1	0: Stunting in A	

## χ<sup>2</sup>=6.5, df=5, p value=0.26

In our study, we found that the maximum was in the age group of 15 years 12 (31.6%), followed by 14 years 9 (23.7%), 13 years 7 (18.4%), 11 years 5 (13.2%), and 12 years 4 (10.6%), while the minimum was in the age group of 10 years 1 (2.6%). The gender-wise prevalence

of stunting showed an increased prevalence among females 26 (68.40%) when compared to males 12 (32%). However, there was no statistical significance in the ageand gender-wise prevalence of stunting among adolescents. (p>0.05) (Table 10).

Parental education		Normal and underweight	Overweight and obese	Total	Chi square and p value
		(n=586)	(n=114)		
	Illiterate	36 (81.8%)	8 (18.2%)	44 (100%)	
	Primary				
	school and	462 (83.1%)	94 (16.9%)	556 (100%)	w <sup>2</sup> -1 (52)
Father's	above				$\chi^{-1.032}$
education	High school	24 (97 20/)	5 (12 90/)	20 (1000/)	di-3 p
	and above	34 (87.2%)	5 (12.8%)	39 (100%)	
					value=0.648
	Graduate and			<b>61</b> (1000)	
	above	54 (88.5%)	7 (11.5%)	61 (100%)	
	Illiterate	28 (80%)	7 (20%)	35 (100%)	
	Primary				
	school and	508 (84%)	97 (16%)	605 (100%)	χ²=1.917
Mother's	above				df 3
education					ur-5
	High school		- /		р
	and above	15 (75%)	5 (25%)	20 (100%)	value=0.590
	Graduate and		5 (10 50)	10 (1000)	
	above	35 (87.5%)	5 (12.5%)	40 (100%)	

Table 11: PE & over-nutri.

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In our study, we found that there is a higher incidence of overnutrition in adolescents whose fathers were illiterate (8.2%), while the minimum was in graduates and above category 7 (11.5%). However, on comparing the ME, it was observed that maximum over-nuti. was in adolescents whose mothers were educated up to high

school and above 5 (25%), while the least was among mothers who were graduates and above 5 (12.5%). There was no statistically significant association between parental education and the prevalence of overwt and obesity p>0.05 (Table 11).

Parental occupation		Normal and underweight	Overweight and obese	Total	Chi square
		( <b>n=586</b> )	(n= 114)		and p value
	Unemployed	26 (89.7%)	3 (10.3%)	29 (100%)	
	Labour	123 (84.2%)	23 (15.8%)	146 (100%)	-2-1,005
Father's	Skilled	393 (83.4%)	78 (16.6%)	471 (100%)	χ-1.003
occupation	Professional	44 (81.5%)	10 (18.5%)	54 (100%)	df-3
					p value=0.8
	Housewife	422 (83.4%)	84 (16.6%)	506 (100%)	
Mathau'a	Labour	64 (86.5%)	10 (13.5%)	74 (100%)	χ²=0.476,
occupation	Skilled	76 (83.5%)	15 (16.5%)	91 (100%)	df-3 p
	Professional	24 (82.8%)	5 (17.2%)	29 (100%)	value=0.924

Table 12: OP &over-nuti.

In our study, we found that the prevalence of over-nutri. is higher in A whose fathers were professionals (10 (18.5%), while the min was in the unemployed category (3 (10.3%). Similarly, on comparing the MO, it was also observed that maximum over-nutri. was in A whose mothers were professionals (5 (17.2%), while the least was amongst mothers who were laborers (10 (13.5%). There was no statistical significance between FO and MO and the prevalence of overweight and obesity (p>0.05) (Table 12).

Dietary risk factors		Normal and underweight	Overweight and obese	Total	Chi square
	Less than or equal to 3	566 (83.9%)	109 (16.1%)	675 (100%)	χ <sup>2</sup> =0.262 df-2 p
Number of	More than 3	20 (80%)	5 (20%)	25 (100%)	value=0.583
Non	Never	105 (86.8%)	16 (13.2%)	121 (100%)	w <sup>2</sup> =1 208
INON-	Occasional	192 (82.1%)	42 (17.9%)	234 (100%)	Af 🤉
Consumption	Frequent	289 (83.8%)	56 (16.2%)	345 (100%)	p
Skinnad meals	Rare	494 (83.6%)	97 (16.4%)	591 (100%)	χ²=0.797
	Occasional	23 (79.3%)	6 (20.7%)	29 (100%)	df_7
	Frequent	69 (86.2%)	11 (13.8%)	80 (100%)	р

#### Table 13: D RF & O A

In our study, we found that the diet-related RF for overwt and O were assessed. It was found that the majority of A consumed less than or equal to 3 meals daily (675, or 96.4%), while 25 (3.6%) consumed more than 3 meals daily. There was a higher prevalence of overwt and obesity among A who consumed more than 3 meals per day (20%) in comparison to those who consumed less than or equal to 3 meals per day (16.1%). The majority

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of the A followed a mixed diet (579 (82.71%), of which 234 (33.4%) consumed a non-vegetarian diet occasionally and 345 (49.3%) consumed it frequently. Over-nutri was slightly higher in A who consumed non-vegetarian food occasionally (42, 17.9%) in comparison to frequent consumption (56, 16.2%); however, this was not statistically significant. (p>0.05) A comparatively smaller number of A, 109 (15.1%), skipped meals, with

occasional skipping in 29 (4.1%) A and frequent skipping in 80 (11.4%). Among A who were overweight or obese, 6 (20.7%) skipped meals occasionally, 97 (16.4%) skipped meals rarely, and 11 (13.8%) frequently. However, there was no statistically significant association between skipping meals and the development of overwt or obesity.(p>0.05) (Table 13).

Lifestyle related risk factors		Normal and underweight (n=586)	Overweight and obese (n= 114)	Total	Chi square and p value
	Not regular	134 (93.7%)	9 (6.3%)	143 (100%)	χ²=18.28,
Television	= 1hr<br daily	118 (87.4%)	17 (12.6%)	135 (100%)	df-2 p value=0.000
	>1hr daily	334 (79.1%)	88 (20.9%)	422 (100%)	
Gadgets	Not regular	295 (86%)	48 (14%)	343 (100%)	χ <sup>2</sup> =15.107, df-2 p value=0.01
	= 1hr<br daily	168 (88%)	23 (12%)	191 (100%)	
	>1hr daily	123 (74.1%)	43 (25.9%)	166 (100%)	
Eating while watching TV	Yes	315 (81.8%)	70 (18.2%)	385 (100%)	χ <sup>2</sup> =2.2 df-1
	No	271 (86%)	44 (14%)	315 (100%)	p value=0.08

#### Table 14: L RF for overwt &O

In our study, we found that the majority of A (557, or 79.6%) had a habit of watching TV regularly; 135 (19.3%) watched for less than or equal to 1 hour daily, while a high proportion of A watched for more than 1 hour every day (422, or 60.3%). There was a significant association between watching TV and overwt and O, where 88 (20.9%) of A with over-nutri. spend more than 1 hour every day on TV, and 17 (12.6%) of the A spend less than 1 hour daily on TV. However, it was observed that there was a comparatively lesser prevalence of overwt and O among A who did not watch TV (6.3%). Thus, it was found that watching TV had a statistically significant association with the development of overwt and O. (p<0.05) Daily use of gadgets showed that of the

total 357 (51%) A who used gadgets, 191 (27.3%) used them for less than or equal to 1 hour daily, and 166 (23.7%) used them for more than 1 hour daily. It was found that most overwt and O A used gadgets for more than 1 hour 43 (25.9%) in comparison to those who spent less than or equal to 1 hour daily 23 (12%). It was observed that there was a lesser prevalence of overwt and O among A who did not use gadgets (48, 14%). There was a significant association between the use of gadgets and the development of overwt and O. (p<0.05) Eating while watching TV was present among 385 (55%) A. It was observed that 70 (18.2%) overnourished A had a habit of watching TV during their meals. This was not statistically significant (p > 0.05) (Table 14).

Lifestyle related risk factors		Normal and underweight (n=586)	Overweight and obese (n= 114)	Total	Chi square and p value
Physical	Yes	356 (90.8%) 230 (74.7%)	36 (9.2%) 78 (25.3%)	392 (100%) 308 (100%)	χ <sup>2</sup> =32.96 df-1 p value=0.000

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activity					
	≥8hrs	195 (81.6%)	44 (18.4%)	239 (100%)	χ <sup>2</sup> =1.201 df-1 p
Sleep	<8hrs	391 (84.8%)	70 (15.2%)	461 (100%)	value=0.161
Time between	Inadequate	383 (83.6%)	75 (16.4%)	458 (100%)	$\chi^2 = 0.008$
dinner and sleep	Adequate	203 (83.9%)	39 (16.1%)	242 (100%)	value=0.511

Table 15: L-RF overwt & O

In our study, we found that majority of overwt and O A did not carry out any PA (78 (25.3%)) in comparison to only 36 (9.2%) who carried out PA. The prevalence of O was higher in children with sleep durations greater than or equal to 8 hours. 44 (18.4%); however, there was no statistically significant association between sleep and over-nutri. Insufficient time was left between dinner and

sleep for 242 (34.6%) A, while 458 (65.4%) A had adequate time between dinner and sleep. Overwt and O were slightly higher in A who left an inadequate time between dinner and sleep (75 (16.4%)) in comparison to those who left adequate time (39 (16.1%). This was, however, not statistically significant. (p>0.05) (Table 15).

Risk factor		Normal and underweight (n=586)	Overweight and obese (n= 114)	Total	Chi square and p value
Family History	Present	73 (82.0%)	16 (18.0%)	89 (100.0%)	χ <sup>2</sup> =.214 df-2
	Absent	513 (84.0%)	96 (16.0%)	611 (100.0%)	p value=0.370
Mode of transport	Non- Motorized	415 (84.7%)	75 (15.3%)	490 (100.0%)	χ <sup>2</sup> =1.15, df-1 p
	Motorized	171 (81.4%)	39 (18.6%)	210 (100.0%)	value=0.168

Table 16: RF for over-wt & O

In our study, we found that a positive F h/o NCD was found to have a co-relation with the development of overwt and O. It was found that the majority of overwt and O A (16%) had a positive family h/o of NCD. This was, however, not statistically significant (p > 0.05). It was also found that there is a higher incidence of overwt and O among A who used motorized transport (39, 18.6%) in comparison to those who cycled or walked to school (75, 15.3%) (Table 16).

#### DISCUSSION

In our study, among the 700 A majority were females 423 upto (60.4%), in comparison to males i.e. 277 upto (39.5%). However, there was no statistically significant difference in the gender-wise distribution. A study from

Orissa on 560 adolescents also showed findings similar to ours, with girls 290 (51.78%) slightly more than boys 270 (48.21%).<sup>6</sup> However, in the majority of the studies, males were found to be more numerous than females. A study from Pune by Swati Ghonge et al., where males were 54.09%, and another study in Rajasthan, where males were 51% .<sup>7</sup> In our study, the mean age of males was  $13\pm1.48$  years and that of females was  $13.06 \pm 1.46$  years. The maximum number of adolescents between the ages of 13 and 14 is 177 (25.3%) in each age group. The male's maximum belonged to 14 years 78 (28.2%), while the female's maximum was 13 years 111 (26.2%). A study from Greece had findings similar to ours, where the mean age of males was  $13.49 \pm 1.36$  (12–17.5) and that of females was  $13.81 \pm 1.51$  (11.5–18).<sup>8</sup> In our study, the

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mean weight of the adolescents was found to be 39.6  $\pm$ 10.4 kg. The mean weight increased as age progressed, with a minimum in 10 years and a maximum at 15 years  $(45.4 \pm 9.5 \text{ kg})$ . A study from Philadelphia also found that the peak growth rate along with the duration was greater for boys than for girls, and there was an 11-13 cm average height difference between adult males and females.9 In our study, a comparatively higher prevalence of overwt and O was seen in a similar study conducted in Egypt, with prevalences of overwt and O of 20% and 10.7%, respectively.<sup>10</sup> A higher proportion of overwt and O was also found according to large-scale studies conducted by Khadilkar et al.<sup>11</sup> with a prevalence of 22.3% (IOTF) and 29.8% (WHO). Lack of exercise or outdoor play was found to be a RF, according to studies conducted in Chennai by Priyadarshini et al.,12 Niranjan N et al.,<sup>13</sup> Manju Sharma et al.<sup>14</sup> Kirti Chaudhary et al.,<sup>15</sup> found that television was also found to be a risk factor according to studies by Priyadarshini et al.,<sup>12</sup> from Maharashtra by Ahmed M et al. 128. Manju Sharma et al. Computer use was also a risk factor, as seen in a study by Manju Sharma et al.14

## CONCLUSION

It is evident that there is a notable prevalence of undernutri., overwt, and O. Therefore, it is necessary to adopt a broader approach to assessing the nutri. S to A and to prioritize efforts to address both over-nutri. and undernutri with the help of HE and SHP to emphasize on the significance of a B.D. and the need of engaging in P.A.

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