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Impact of Food habits on Obesity among school going Adolescent in Madurai District, Tamil Nadu, India

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Abstract: **India has the second highest number of obese children in the world after China, according to a study that has found that 14.4 million children in the country have excess weight. Off late overweight and obesity, has gained a foothold. Changing dietary pattern towards energy-dense and high-fat diets, together with the rising urbanization that has brought about a more sedentary life style, and that to lead obesity. Methods: This is a cross sectional study conducted in the Government and private schools of Madurai city among the students of class 7th to 12th std. Schools were selected simple purposive from the list of secondary and higher secondary schools of Madurai city. All the children belonging to either gender in the age group of 13 - 18 years, who were apparently healthy, were included in the study. Questionnaire has been used for gathering information with respect to the dietary pattern and the frequency of consumption of various types of non- vegetarian foods for the past one-month was collected on all the overweight and obese subjects. Results: In this study, girls were more commonly overweight (74 out of 308, 4.16%) than boys (50 out of 202, 4%) while obesity prevalence was comparable in both the sexes (152 out of 202 i.e. 1.32% in boys and 234 out of 308 i.e. 1.30% in girls). Conclusion: Pearson's correlation shows that BMI is significantly related to all the asked dietary habits at 0.01(2-tailed) level and it consumption of mutton and chicken is positively correlated with BMI (.017, .061). Simultaneously consumption of non-veg fish, egg were negatively correlated with BMI.**

Keywords: **Adolescents, BMI, Diet pattern, Madurai District, Tamil Nadu, India. Obesity.**

1. INTRODUCTION

Early stage of adolescent is characterized by an exceptionally rapid rate of growth and is often variable in individuals due to its dependence on genetic hormonal and nutritional factors.[6] Obesity in children and adolescents is a serious issue not only because of the health consequences in childhood and adolescence but also because of the greater risk of obesity in adulthood. Epidemiological literature shows that about one-third of obese pre-school children and about one-half of obese school age children become obese adults.[5]

In recent decades, the prevalence of obesity in children and adolescent has risen steeply world-wide.[3] A high prevalence of adolescence obesity and overweight cases has been reported in developing countries undergoing nutritional transition.[4] These are emerging as a major public health problem in India also.[7]

Obesity and overweight have traditionally being linked to intake of high calorie food and lifestyle but it is now seen that certain habits like skipping breakfast, being selective about food, etc. are also important determinants. Being selective about food is defined as only eating favourite foods and not eating foods that are disliked. Such habits are quite common in children and adolescents.

Florentino RF et al emphasised that the emerging problem of overweight and obesity in children and adolescents has arisen from the changing dietary pattern towards energy-dense and high-fat diets, together with the rising urbanization that has brought about a more sedentary lifestyle.

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2. MATERIALS AND METHOD

2.1. Study Area

Madurai is a major city in the state of Tamil Nadu in India. It is the cultural capital of Tamil Nadu and the administrative headquarters of Madurai District, the third largest city in Tamil Nadu and 25th most populated city in India. [1] Located on the banks of River Vaigai, Madurai has been a major settlement for two millennia. The city covers an area of 147.97 km2 and had a population of 1,561,129 in 2011. [2] According to the census of 2011, Madurai had 85.8% Hindus, 8.5% Muslims, 5.2% Christians and 0.5% others. Madurai is closely associated with the Tamil literature, culture and traditional food habits and Tamil as a mother tongue.

2.2. Profile of the subjects

The school based cross-sectional study was conducted among early adolescent girls studying in 7^{th} standard to 12^{th} standard (13-18 years old) of five Government approved Higher secondary schools in Madurai corporation and six private approved Higher secondary schools in Madurai corporation, from November 2017 to March 2018. We adopted a simple purposive sampling procedure for the selection of the schools.

This is a cross sectional study conducted in the Government and private schools of Madurai city among the students of class 7th to 12th std. Schools were selected simply from the list of secondary and higher secondary schools of Madurai city. All the children belonging to either gender in the age group of 13 - 18 years, who were apparently healthy, were included in the study. Cross sectional study was done using simple purposive sampling.

These schools had a substantial number of students belonging to Hindu, Muslims and Christian. As per the registers available with the schools, Among 5 Government schools, 5364 children in the defined age group were enrolled. Among 6 private schools, 2321 children in the defined age group were enrolled. Among these 731 people were taken for the study. But only 520 samples were respond and cooperated for my work.

2.3. Anthropometric Measurements

The height and weight measurements were made and recorded following the standard techniques. Height and weight were measured using anthropometric rod and weighing scale to the nearest of 0.1 cm and 0.5 kg, respectively. The weighing scales were calibrated daily against standard weight. Technical Errors of Measurements (TEM) were computed and they were found to be within acceptable limits. BMI was computed using the following standard equation: BMI = Weight in kg/height squared in meter.

2.3.1. Assessment of dietary pattern

Twenty four hour recall method was used to assess the dietary pattern of selected subjects. It is used to establish and depict meal plan by a diet history. Questionnaire has been used for gathering information with respect to the dietary pattern and the frequency of consumption of various types of non -vegetarian foods for the past one-month was collected on all the overweight and obese subjects.

2.3.2. Definitions

Overweight and obesity were defined on BMI cut-off points, which are gender and age specific. **(i)** for the CDC growth charts the BMI cut-off points are 85^{th} and 95^{th} percentiles for overweight and obesity respectively; **(ii)** the IOTF reference is based on the BMI of 25 and 30 at the age of 18 for classification of childhood and adolescent overweight and obesity, respectively; **(iii)** for the WHO reference, percentiles expressed in Z scores determine the cut-off points for overweight and obesity at 85^{th} and 98^{th} percentiles, or +1 SD and +2 SD, respectively.

2.4. Ethical Consideration

Parents, teachers and the students in the selected schools were well-informed on the scope and extent of the survey and consent of the parents were also obtained.

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3. RESULTS AND DISCUSSION

Table 1: Distribution of the study population According to Age and Sex of adolescents in Madurai City

Sex	Government School		Private School		Total	
	No	%	No	%	No	%
Male	82	15.76	122	23.46	204	39.22
Female	216	41.53	100	19.23	316	60.76
Total	296	57.30	222	42.70	520	100

Table 1 shows that out of 520 respondents, female respondents were 316 (60.76%) and male respondents were204 (39.22%).Majority 296 (57.3%) of respondents were studying in Government School. Among this female respondents were 216 (41.53%) and male respondents were 82 (15.76%).

Table 2: BMI of selected School going Adolescents in Madurai City

BMI	Female	Percentage	Male	Percentage	Total	Percentage
Normal	4	0.76	2	0.38	6	1.2
Overweight	75	14.4	50	9.6	125	23.8
Obese	237	45.5	152	29.2	389	74.2

A total of 520 school children were included in the study. 204 were males and 316 females (Table1).74.2% (386) students were found to be obese while 23.8% (124) were overweight. Only 1.2% (6) children, BMI was normal. In this study, girls were more commonly overweight (75 out of 316, 14.4%) than boys (50 out of 204, 9.6%) and obesity also were high in girls (237 out of 316 i.e. 45.5%) than boys (152 out of 204 i.e. 29.2%)

Table 3: Food Consumption pattern of selected School going Adolescents

Questions Answers	Male		Female		Total	
NV Type	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Fish	36	6.93	72	13.86	108	20.8
Mutton	14	2.7	28	5.4	42	8.1
Chicken	42	8.06	108	20.73	150	28.8
Egg	20	3.86	24	4.63	44	8.5
All	92	17.66	84	16.13	176	33.8
NV Time Once a Day	8	1.53	16	3.0	24	4.6
Twice a day	0	0	10	1.9	10	1.9
Weekly once	120	23.06	176	33.83	296	56.9
Occasionally	54	10.38	102	19.61	156	30
More often	22	4.20	12	2.29	34	6.5
More than normal Yes	80	15.36	96	18.43	176	33.8
No	124	23.86	220	42.33	344	66.2
Quantity Extra	188	36.16	284	54.63	472	90.8
More than extra	16	33.06	32	6.11	48	9.2
Reason Tasty	134	25.76	176	33.83	310	59.6
Nutritious	24	4.61	42	8.08	66	12.7
Used it	16	3.08	54	10.41	70	13.5

Healthy	18	3.44	16	3.05	34	6.5
Available at home	2	0.4	2	0.4	4	0.8
Parents compulsion	10	1.91	26	4.98	36	6.9
NV Taken Place Home	194	37.30	272	52.29	466	89.6
Outside	10	1.92	44	8.47	54	10.4

In this study Dietary habit associated with high BMI. This could be because of an overall increase in the quantity of non-vegetarian of food consumed during the day, that is Fish consumption 72 (13.86%) girls and 36 (6.93%) in boys, mutton consumption 28 (5.4%) in girls, 14 (2.7%) in boys. Chicken consumption 108 (20.73%) in girls and 42 (8.06%). The consumption of egg 24 (4.6%) in girls and 20 (3.8%) in boys. This shows increased consumption of non-veg correlated with BMI of girls than boys. The Frequency of non-veg consumption pattern were included in this study. Weekly once 176 (33.8%) in girls, occasionally 102 (19.6%) in girls and 22 (4.2%) in boys, more than normal consumption were 96 (18.4%) in girls and 80 (15.36%) in boys, Quantity of extra non-veg consumption were 284 (54.6%) in female, 188 (36.1%) in boys. More than extra eaters were 32 (6.1%) in girls, 16 (3.0%) in boys. The reason for take extra and man then extra was incorporated with BMI of both sex non-veg food is tasty 176 (33.8%) in girls, 134 (25.7%) in boys, Nutritious 42 (8.0%) in girls 24 (4.6%) in boys, used it 54 (10.4%) in girls 16 (3.4%) in boys. Healthy 16 (3.0%) in girls, 18 (3.4%) in boys, available at home both are same 2 (0.4%) parents compulsion 26 (4.9%) in girls, 10 (1.9%) in boys.

Table 4: Dietary habits associated with high BMI

	Type of food	**BMI(P Value)**
Dietary Habit	Non Vegetarian	.068
	Vegetarian	-.071
	Ova Vegetarian	.024
Non Vegetarian food	Fish	-.041
	Mutton	.017
	Chicken	-.061
	Egg	-.035
	All	-.013

**. Correlation is significant at the 0.01 level (2-tailed).

There is a positive correlation between non-vegetarian food consumption (0.068), ova vegetarian (0.024) with BMI. Simultaneously vegetarian food consumption gives a negative correlation with BMI (- .071). Dietary habit that is consumption of non-vegetarian (mutton and chicken) is positively correlated with BMI (.017, .061). Simultaneously consumption of non-veg fish, egg were negatively correlated with BMI.

4. CONCLUSION

Nutritional transition has contributed to the problem of school children. Dietary habits are one of the major determinants of overweight/obesity. In this present study, obesity and overweight were found to be higher in school children who consume the fried local foods, non-vegetarian foods, pizza/burger frequently. BMI is significantly related to dietary habits.

Other factors like extra Consumption of non -vegetarian become important if taken once a day, regularly or at high frequency. So interventions are needed starting at school level, the students should be taught about importance of regular and balanced diet, physical activities. Schools are the ideal place for intervention as they are center to children's lives and information can be relatively quickly dissipated through this age.

It is recommended that the teachers were sensitized in such a way that giving lifestyle modification, in school premises, Canteens can be instructed to provide healthy foods, physical activity should be made mandatory in schools and colleges, it is emphasized that the Parents should adopt a healthy lifestyle and giving a balanced diet can thus become a role model for their kids. Successful intervention for obesity is the best accomplished using multimodal approaches to accomplish substantial lifestyle changes. A combination of nutritional advice, exercise and cognitive behavioral approaches usually works the best. As advised by the WHO, physical activities for at least 30 min/day is implemented vigorously.

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