IDENTIFY THE CONTRIBUTORY FACTORS AND PREVALENCE OF OBESITY AMONG CHILDREN IN SELECTED SCHOOLS, PUDUCHERRY.

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Abstract:

Background: Nutritious foods help us to maintain good health. Consumption of healthy foods in a balanced form help us to minimize the health-related problems. Obesity among children and adolescents has adverse consequence onpremature mortality, and physical morbidity in adulthood and is associated with impaired health during childhood. The risk factors of obesity and overweight explored from different studies revealed that, the genetic history, physical activity, high birth weight, and type of milk intake during infancy, morethan two hours of television watching per day, frequency of regular meals and overweight of the parents. The purpose of the study was to identify the contributory factors and prevalence of obesity among children

Objectives: To assess the level of obesity among selected school children at Puducherry. To identify the contributory factors leading to obesity To associate the pretest level of obesity with selected demographic variables of school children at Puducherry.

Materials And Methods: The quantitative research approach was selected and non-experimental descriptive research design was used. The study was conducted among 1062 school children studying 8th and 9th standard in selected Government and Private schools at Puducherry In this study, cluster sampling technique was used to select the schools and Non probability – convenient sampling technique was used to assess the obesity. Totally six schools were selected and sampling frame was made. Data collection tool was consisting of three sections and validated by the subject experts. Obtained ethical approval to conduct the study

Results and conclusion: The prevalence of overweight and obesity was found to be 9.7% and 4.9% respectively. Key contributory factors identified include genetic history, physical activity, birth weight, milk type in infancy, television watching, meal frequency, and parental overweight.

Keywords: contributory factors, prevalence, obesity, overweight and school children.

Introduction

The raise of childhood obesity has placed the health of an entire generation at risk. The destiny of the human race is in the hands of those who tend to be the children of today. Faulty food practices, excessive weight gain and obesity are major problems in children. Overweight and obesity is the result of unhealthy eating patterns and too little physical activity. Excess body fat frequently results in increased risk of Heart disease, Diabetes, Gallbladder diseases and Liver diseases, Arthritis and

Cancer. WHO (2016) reported that the overweight and obesity among under five children were 41 million and 340 million children were aged 5-19 years especially in urban settings. By 2030, the public health agenda of WHO put the obesity in the apex as it is an avoidable risk factor for many disorders based on study reports with diet, nutrition, and prevention of chronic diseases.[1-4]

The role of physical activity, games, and sports should be encouraged, and facilities should be arranged for outdoor games in schools, with compulsory time for physical education. There is a necessary need to educate the urban population on the aspects of healthy dietary habits and healthy lifestyles to prevent overweight/obesity and its ill effects in the future.

STATEMENT OF THE PROBLEM

Identify The Contributory Factors and Prevalence Of Obesity Among School Children At Puducherry.

OBJECTIVES

1. To identify the contributory factors leading to obesity among schoolchildren.
2. To assess the level of obesity among selected school children
3. To associate the pretest level of obesity with selected demographic variables of school children at Puducherry.

Hypothesis

H1: There is a significant association exists between the level of obesity with selected demographic variables of school children.

METHODS AND MATERIALS

Research Approach: The quantitative research approach was adapted for the present study.

Research Design: Non-experimental descriptive research design was used. Based on survey method the researcher assessed the level of obesity by using WHO growth chart and identified the contributory factors leading to obesity among the selected school children studying 8th and 9th standard during the academic year of 2016 to 2018.

Setting of the Study: The study was conducted in selected Government and Private schools at Puducherry. The Research proposal was discussed with Chief Educational Officer (CEO) and principals of the private and government schools, based on their need.

Population: In this study the population includes children studying in 8th and 9th standard during the academic year 2016-2018 in selected schools at Puducherry.

Sample: Identify the contributory factors and **a**ssessment of level of obesity based on BMI and WHO growth chart among selected school children studying,8th and 9th standard at Puducherry, who met inclusion criteria were included.

Sample Size Calculation: As per the pilot study, the prevalence of obesity was found to be 14.19 keeping this as prior information the sample size was determined with the precision as 3%, confidence interval level as 95%. The following formula has been used,

Sample Size: The estimated sample size was 1040.average number of children in each school is 175. So, the researcher required six schools to achieve the sample size of 1040. During the time of data collection, the researcher got additional subjects ineach school, and decided to enroll the additional sample of 22 numbers. Hence the researcher selected 1062 samples for the study.

Sampling Technique: In this study, cluster sampling technique was used to select the schools. Totally six schools were selected and sampling frame was made and Non probability – convenient sampling technique was used.

Ethical Consideration: An approval to conduct the study in schools was obtained from Chief Educational Officer at Puducherry and Headmistress/ Headmasters of concern schools. For ethical consideration, an approval to conduct the study was obtained from the Human Institutional Ethical Committee RMMC, Annamalai University. Informed written consent was obtained from each individual samples and their parents. The description of the consent form includes purpose of the study, title, duration, confidentiality, benefits, opportunity to withdraw and researcher in detail.

Criteria for Sample Selection

Inclusion Criteria: The school children who are, willing to participate the study, Studying 8th and 9th standard during the academic year of 2016-18 in selected schools at Puducherry. and Able to communicate in English and Tamil.

Exclusion Criteria: The school children who are, absent during data collection,physically challenged children, Under treatment for medical, surgical problems.

Description of the Data Collection Tool
The data were collected by using WHO growth charts for assessing the level of obesity and structured questionnaire to assess the knowledge on obesity, identify the contributing factors leads to obesity among school children. In this study the tool consists of 3 sections.

Section A: Demographic Variable of the Study
Section B: Assessment of level of obesity based on BMI (Body Mass Index) according to the WHO growth chart (2007) It includes checking of height, weight and calculated Body Mass Index.

Scoring and interpretation: The BMI was calculated by using formula, BMI= Weight in Kilogram / Height in Meter^2 and it is classified according to WHO growth chart. The height and weight were measured by the researcher. The levelof obesity was calculated according to the WHO growth chart.

Section C: Structured Questionnaire to Identify the Contributory Factors Leading to Obesity
This was developed by the researcher after an extensive literature reviewand experts' opinion. It is a multiple-choice question with four options. Totally33 items are there and it is divided into five components such as food habits, eating pattern, physical activity, family factors and educational factors. It was translated in vernacular language for easy understanding by the school children. The data were used only for identifying the contributory factors leading to obesity analysis

Content Validity: Content validity was obtained from experts in the field of child health nursing, Community health nursing and Physical education officer to examine the relevancy and accuracy of the items. Then it was pilot tested to assess the feasibility and ease administration.

Reliability of the Tool: Cornbach's Alpha co-efficient method was used to assess the reliability of the structured questionnaire on prevention and management of obesity, Contributory factors of obesity It was found to be good reliable and the corresponding score was 0.81, 0.8 and 0.92.

Pilot Study: The pilot study was conducted to ensure the validity and reliability of the tool feasibility for giving the intervention. Ethical clearance was obtained to conduct the study among the children, parents and teachers. The pilot study was conducted and the toolwas found to be feasible and the result showed that they were appropriate.

RESULTS

Major Findings of the Study

The total of 1062 school children were listed from selected schools at Puducherry. The school children were classified into underweight, normal, overweight and obese using WHO growth standards

General profile: Descriptive analysis of the demographic variables represented,that the maximum no. of school children were females 532 (50.1%) and nearly 530(49.9%) school children were males. The maximum no of subjects 593(55.8%) were from the 9th Standard whereas 469(44.2%) subjects were fromthe 8thStandard.

Prevalence of obesity: In overall assessment, the prevalence of overweight was9.7% (103) and obesity was 4.8 % (52) among selected school children, Puducherry. In those 30 boys were obese and 22 were girls. The No of overweight among girls was 56 and boys were 47 numbers. Regarding the type of schools, the number of obesity and overweight children in private schools were 43 and 79. In Government schools, the numbers of obesity and overweightchildren were 09 and 24

Identification of contributory factors leads to obesity

The contributory factors lead to obesity also identified and presented in table no 11,12,13,14 and 15 shown that there was a statistically significant association exists between the contributory factors such as Dietary Pattern, Eating Pattern, Physical Activity, Family related factors and Academic Factors with the level of obesity at $p < 0.001$ and $p < 0.005$.

Association between Obesity with Selected Demographical Variable

The result presented in the table 18 interprets the association between the levels of obesity with selected demographic variables of selected school children such as class, gender, educational status of the father and mother , occupational status of the father, family type, siblings residential area and common health problem of the family were found to be statistically significant at $p < 0.001$.The other demographic variables such as religion, mothers' education source of information, weight of the child and habit of left out the food were found to be non-significant

Table 1: Frequency and Percentage Distribution of Prevalence of Level of Obesity among Selected School Children based on their Gender (N = 1062)

Level of Obesity	Boys		Girls		Total	
	No.	%	No	%	No.	%
Underweight(< 5%)	73	13.8	36	6.8	109	10.3
Normal Weight (5– 85%)	380	71.7	418	78.6	798	75.1
Overweight (85– 95%)	47	8.9	56	10.5	103	9.7
Obese (≥ 5%)	30	5.7	22	4.1	52	4.9

Table 1 predicted the frequency and percentage distribution of level of obesity among selected school children based on theirgender. Based on the body mass index assessment of overweight, the maximum 56(10.5%) school children were girls, 47(8.9%) school children were boys. In overall assessment of obesity, the maximum 30(5.7%) school children were boys, 22(4.1%) girls were found in obesity. Regarding the underweight, the majority 73(13.8%) school children were boys and 36(6.8%) school children were found in girls' category.
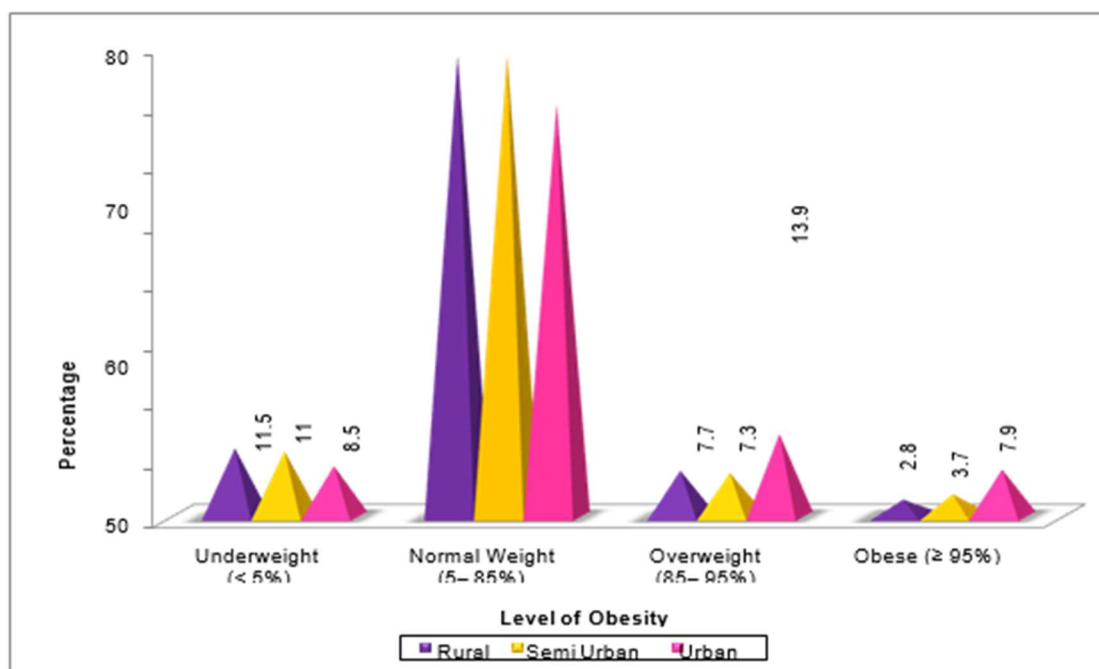
Table 2:Frequency and Percentage Distribution of Prevalence of Level Obesity Among Selected School Children Based on their Type of School (N = 1062)

Level ofObesity	Type of School				Total		χ^2	p value
	Government		Private					
	No.	%	No.	%	No.	%		
Underweight (<5%)	53	16.72	56	7.52	109	10.3	24.674	**0.001(S)**
Normal Weight (5-85%)	231	72.87	567	76.10	798	75.1		
Overweight(85-5%)	24	7.57	79	10.60	103	9.7		
Obese (>95%)	09	2.84	43	5.78	52	4.9		

S - Significant at p < 0.05 level

Table 3 showed the frequency and percentage distribution of level of obesity among selected school children according to their school. Based on the body mass index assessment of overweight, 79(10.60%) school children were identified in private schools, 24(7.57%) children were identified in government schools, and 43(5.78%) school children were identified obese in private schools, 9(2.84%) school children were found obese in government schools.

The calculated chi-square value was 24.674 and it was found to be statistically significant at the level of p<0.001.

S - Significant at p < 0.05 level
**Figure – 1 Percentage Distribution of Prevalence ofLevel of Obesity Among Selected School
Children based on their Residential Area**

Figure 1 highlighted the frequency and percentage distribution of level of obesity among selected
school children according to their residential area. In overall assessment of obesity, 29(7.9%) obese
children were residing in urban area, 15(3.7%) obese children were residing in semi urban area, and
8(2.8%) obese children were residing in rural area. Based on the body mass index assessment of
overweight, 51(13.9%) children were residing at urban area, 30(7.3%) children were residing in semi
urban area, 22(7.7%) of children were residing in rural area. Regarding the underweight, the majority
45(11%) children were residing in semi urban area, 33(11.5%) school children were residing in rural
area 31(8.5%) school children were residing in urban area.

*The calculated chi-square value was 25.08 and was found to be statistically significantat the level
of p<0.001.*

**Table 03 : Association Between Dietary Patterns and the Level of Obesity Among Selected School
Children (N = 1062)**

Dietary Pattern		Level of Obesity				χ^2	p value
		Under-weight	Normal Weight	Over-weight	Obese		
The frequency ofeating non Vegetarian items/month	Daily	13	128	48	32	124.72	**0.001(S)**
	Weekly once	33	235	31	6		
	Occasionally	38	275	22	13		
	Never	25	160	2	1		
The Most	Egg and Fish	26	179	17	4	66.89	**0.001 (S)**
used NV item	Mutton (Meat)	33	245	28	17		

in diet	Chicken	25	207	55	29		
	None	25	167	3	2		
The frequency of eating vegetarian items /Month	Daily	16	148	13	4	18.91	**0.001(S)**
	Alternative days	47	375	59	36		
	Weekly Once	40	254	29	11		
	Occasionally	6	21	2	1		
The most used vegetarian items in your diet	Green leafy vegetables	15	111	10	4	50.393	**0.001(S)**
	Roots and Tubers	38	288	32	11		
	Pulses and cereals	51	320	43	17		
	Milk and Its products	5	79	18	20		
The method of preparation of the food	Boiling	35	219	5	3	96.77	**0.001(S)**
	Steaming	34	231	19	6		
	Roasting	32	264	71	41		
	Frying	8	84	8	2		
The frequency oftaking food from outside hotel/ Month	Daily	2	66	29	30	166.59	**0.001(S)**
	Weekly Once	47	257	40	12		
	Occasionally	39	357	29	8		
	Never	21	118	5	2		
Adding of sweets in diet/week	Daily	3	55	41	30	222.14	**0.001(S)**
	Twice in a week	30	230	37	10		
	Occasionally	69	471	23	10		
	Never	7	42	2	2		
The drink preferred	Coffee / tea	43	308	9	2	318.26	**0.001(S)**
	Fresh Juice	31	214	10	6		
	Soft drinks	1	110	75	40		
	None	34	166	09	04		
The Habit of eating junk foods	Daily	1	16	30	27	401.95	**0.001(S)**
	Alternative day	4	156	54	16		
	Occasionally	91	577	16	8		
	Never	13	49	3	1		
Consuming Sugar Sweetened Drinks	Daily	2	24	22	21	243.85	**0.001 (S)**
	twice / week	17	178	52	22		
	Occasionally	49	382	24	9		
	Never consumed	41	214	5	0		
The place where the lunch provision by	Home/School food	95	631	32	9	200.47	**0.001(S)**
	Outside hotel	7	89	31	19		
	Fast foods	4	73	39	24		
	Only Snacks	3	5	1	0		

S - Significant at p < 0.05 level NS – Non Significant

Table 4 represented the distribution of factors related to dietary pattern associated with the level of obesity among selected school children. The calculated p value shown that there was a statistically significant association between most used Non vegetarian item in their diet, frequency of eating vegetarian items / month, method of preparation of the food, frequency of taking food from outside / month, adding of sweets in diet, drink preferation, habit of eating junk foods, consuming sugar sweetened drinks, daily lunch provision and level of obesity among selected school children the level of significance at p<0.05. Some of the factors such as the number of times used raw vegetables/ week, the frequency of eating fruits, and the amount of water or drinks/day were not statistically significant and not associated with the level of obesity among selected school children.

Table 5: Association between Physical Activities and the Level of ObesityAmong Selected School Children (N = 1062)

Physical Activity		Level of Obesity				χ^2	p value
		Under-weight	Normal Weight	Over-weight	Obese		
Hours of television watching / day	Less than one hour	12	81	6	1	44.86	0.001 (S)
	2 Hours	66	444	36	10		
	3 Hours	30	263	55	32		
	Above 3 Hours	1	10	6	9		
Mode of Transport used for school	By walking	10	39	4	0	177.69	0.001 (S)
	Bicycle	55	316	24	14		
	2-Wheeler	40	374	32	10		
	4-Wheeler	4	69	43	28		
Duration of playing outdoor games	Never	3	12	4	2	22.85	0.001 (S)
	Less than 1 hour	43	334	63	33		
	1 hour	59	439	36	17		
	2 hours and above	4	13	0	0		
Daytime sleeping Hours / Day	Never	84	506	20	4	149.92	0.001(S)
	1 Hour	12	195	53	31		
	2 Hour	9	84	28	15		
	More than 2 hours	4	13	2	2		
How often involve the house holding	Never	1	16	30	27	401.95	0.001(S)
	Occasionally	4	156	54	16		
	Sometimes	91	577	16	8		

works	Always	13	49	3	1		

S - Significant at p < 0.05 level

Table 5 represents distribution of physical activities associated with the level of obesity among selected school children. The calculated p value has shown that there was a statistically significant association between Hours of television watching /day, mode of transport, duration of playing outdoor games, daytime sleeping hours/day in day time, duration of daily exercises, the duration of involving house holding works of children and the level of obesity among selected school children was significant at p<0.05 level. Some of the factors such as sleeping hours/day in night time, indoor games and type of exercise were not statistically significant and not associated with the level of obesity among selected school children.

Table 6 : Association Between Family Factors and the Level of Obesity Among Selected School Children N = 1062)

Family Factors		Level of Obesity				$\square^2$	p value
		Under-weight	Normal Weight	Over-weight	Obese		
Body builtof father of child	Thin	62	360	23	6	155.77	**0.001(S)**
	Moderately Built	12	193	69	40		
	Obese	35	245	11	6		
Body builtof mother of child	Thin	52	276	15	5	88.98	**0.001(S)**
	Moderately Built	12	171	35	35		
	Obese	45	351	53	12		
Frequency of getting Pocket money	Daily	2	127	75	41	301.51	**0.001(S)**
	Alternative day	48	419	21	6		
	Weekly once	57	248	7	4		
	Never	2	4	0	1		
Amount of Pocket money / Day	Below Rs. 20	72	488	27	9	99.48	**0.001(S)**
	Rs. 21 –340	22	194	44	16		
	Rs. 31 – 40	14	112	32	26		
	Rs. 50 and above	1	4	0	1		
The Oil Used for Cooking	Palm Oil	12	94	7	7	20.45	**0.001(S)**
	Sunflower Oil	40	275	27	12		
	Groundnut Oil	50	393	56	27		
	Any other Oil	7	36	13	6		

S - Significant at p < 0.05 level

Table 7 represent the distribution of family factors associated with the level of obesity among selected school children. The calculated p value has shown that there was a statistically significant association between body built of father and mother of child, frequency and amount of getting pocket money, oil used for cooking and the level of obesity among selected school children were significant at p< 0.05 level.

For the above variables the stated **Hypothesis (H1) there is a significant association exists between the level of obesity with demographic variables of selected school children was accepted.**

DISCUSSION

The discussion of the study deals with appropriate literature review statistical analysis and findings of the study based on the objectives of the current study.

The first objective of the study was to assess the level of obesity among selected school children at Puducherry.

The overall prevalence of level of obesity were found that, 109(10.3%) falls in underweight, 798(75.1%) of children found in normal weight, 103(9.7%) falls in overweight and 52(4.9%) of children found in obese.

The findings also revealed the higher prevalence rate of overweight and obesity 10.6%, 5.78% respectively in private schools, 13.9% and 7.9% respectively documented in urban areas. The highest obesity 5.7% rate was recorded in male children and the majority of the overweight 10.5% observed in girl children. The calculated chi-square value was 59.816 and was found to be statistically significant at the level of p<0.001.

The above results are supported by the following studies:

Another study to determine the prevalence of overweight and obesity among 2291 studying in private schools with age groupof 11-14 years. The study results shown that the significant increase in overweight and obesity among school children belonging to urban private schools and the prevalence of overweight and obesity was 9.6% and 5.2% respectively.

Obesity in children and adolescent is gradually becoming a major public health problem in many developing countries including India. One and half of obese school children become obese adults. However, whether or not obesity persist into adulthood, obesity in childhood appears to increase the risk of non-communicable disease in future

Karthikeyan, et al. (2016) examined a cross sectional study on prevalence of overweight,obesity among 890 school children in the age group of 5 to 15 years in a rural school Neelambur, Coimbatore. The study results showed that, the overall prevalence of overweight and obesity was 8.32%, 4.72%, among boys' overweight and obesity were 8.43% and 6.43% whereas in over weightand obesity among girls 8.20 and 2.96% respectively.

On school wise evaluation the rate was found that there was higher prevalence of overweight and obesity among school children from private schools as compared to the children of government schools. This variance due to effects of life style, dietary habits and socio-economic factors of the children studying in private schools.

On gender wise evaluation, it was noted that male children were more prevalent in obesity as compared to female children and could be explained by difference in eating habits andhormonal effect. In the present study identified the higher prevalence rate of overweight and obesity in urban residential area, these findings might be attributed by availability of junk foods, financial status of the

family, indoor games and adaptation of modern life. All these findings were similar to the several studies conducted at national and international level[5-7].

The second objective of the study was to identify the contributory factors leading to obesity among selected school children.

The study results revealed that there was a statistically significant association exists between the contributory factors such as dietary pattern, eating pattern, physical activity, family related factors and academic factors with the level of obesity at p< 0.001 and p<0.005. The studyresults shown that, the eating habits, dietary pattern and physical activities, habit of taking junk food and genetic factors are leading to obesity.

The study results were supported by the findings of other researches,

Shate, et al. (2018) conducted a cross sectional study to identify the prevalence and risk factors of obesity among 207 adolescent children in western Maharashtra. The study findings revealed that the overall rate of obesity was 8.7% and 77.3% of the school children were eating junk food daily. The authors concluded the awareness of junk foods needed to prevent obesity in future.

Family dietary patterns, parenting, physical activity and influence of junk food practices etc, play a very important role in weight patterns of school children. Due to easy availability and affordability junk food is getting preferred over expensive fruits and vegetables in individual households are commonly happened. This study then addressed, the important issue of findings, the prevalence and evaluating the role of family factors leading to obesity. Education, occupationand family income are an indirect measure of Socio-Economic Status (SES) of the family. The study clearly identified the factors leading to overweight and obesity among school children.

An identification of contributory factors leads to obesity was found that, frequency of eating vegetarian Items, most of them used non vegetarian item in their diet, method of preparation of the food, frequency of taking food from outside / month, adding of sweets in diet, drink preference, habit of eating junk foods, consuming sugar sweetened drinks, habit of skipping breakfast and meals, no. of time consuming food / day, the item of food takes during snacks time, hours of television watching / day, mode of transport, duration of playing outdoor games, daytime sleeping hours / day, sleeping hours/day and night, duration of daily exercises,

Thus, the environmental factors, which contribute to overweight and obesity. The findings revealed that, contributing factors leading to obesity such as food habits, eating pattern, physical activity etc., among school children.

The third objective of the study was to associate the pretest level of obesity with selected demographic variables of school children

The result presented in the table no 18 interprets the association between the levels of obesity with selected demographic variables of selected school children such as class, gender, educational status of the father and mother, occupational status of the father, family type, siblings' residential area and common health problem of the family were found to be statistically significant at p<0.001. The other demographic variables such as religion, mothers' education source of information, weight of the child and habit of left out the food were found to be non-significant.

These findings were supported by the following studies:

Elangovan, et al. (2018) conducted a community based cross sectional study to assess the factors affecting obesity and overweight among 4900 adolescent children in urban setting, Chennai. The results of the study shown the overall prevalence of obesity was 4.1% and overweight was 22.1

and significant association between the obesity and parental occupation, educational status, level of physical activity and food preferences.

In this present study prevalence of obesity in urban, semi urban and rural schools were 44.2%, 28.8% and 26% respectively. This result was statistically-highly significant with P value <**0.001**. This research result was supported by the similar study results.

The health risk of obesity and overweight included cardio vascular disease, diabetes, hypertension, arthritis, gall bladder disease and cancers not only increase health risks but also the social and economic consequences. And also associated with decreased self-esteem and depressive symptoms. Obese children often exposed to teasing, discrimination, victimization andsocial exclusion[8].

The study developed and validated the "Suchitra score," an 11-question questionnaire to assess lifestyle practices among students. Despite poor sleep quality, physical activity, and dietary patterns, low alcohol and smoking incidence were noted. The questionnaire is a reliable and valid tool for lifestyle assessment.

Another study of 2,000 school children (aged 8-17) revealed 72% were malnourished, with only 0.06% being obese. Private school children fared better but 58% were still underweight. High fast-food consumption and limited playtime were prevalent. There's an urgent need to encourage physical activity and ban fast food in schools[9,10] The focus should be on addressing undernutrition rather than obesity in Indian schoolchildren.

CONCLUSION: In India many studies have been conducted with the aim of assess theoverweight and obesity in school children studied in private schools. In present study, differentschools were selected randomly and 1062 children studied in Puducherry region.

On evaluation of socio demographic profile, the majority 50.1% of female and the maximum no 55.8%of subjects from 9th standard. Most of the children 38.5%residing in semi urban area. And the employment status was noted that father of children was employed and mother were house wife The school children were classified into underweight, normal, overweight and obese using WHO growth standards 2007.The prevalence of overweight and obesity was found to be 9.7% and 4.9% respectively. These findings suggested that, children belonging to higher socio- economic status and who are study in private schools and resides in urban areas are higher risk of obesity and also associated with life-style changes leading to inappropriate diet and increasing levels of physical inactivity.

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