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# A study on Overweight and Obesity among Adolescents (10-19 Years) in a Rural Area of Kanyakumari District

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## ABSTRACT

**Background:** Overweight and Obesity has emerged as one of the most important public health problem escalating to be a global pandemic. .It is the most prevalent form of malnutrition and it is a global concern. Aims &Objectives: To find out the prevalence of overweight and obesity among adolescents in a rural area of Kanyakumari district and to find out the association between overweight and obesity with its modifiable and non-modifiable risk factors. **Material and Methods:** The study was conducted at Thiruvattar block. It is a cross sectional study where 400 adolescents of both sexes were included. The study involved administration of pretested questionnaire, measurements of anthropometry, waist and hip circumferences. **Results:** The Prevalence of Overweight and obesity was 8.5% and 5.8%. The factors which were significantly associated with overweight and obesity are sex, type of school, socio economic status, educational status, skipping breakfast, food in between the meal, waist hip ratio and physical activity. **Conclusion:** Overweight and obesity are more common in females, high socio economic status, those with inadequate physical activity and who are consuming junk foods.

**Keywords:** Obesity, Overweight, Prevalence, Physical activity, Dietary practice.

## Introduction

Overweight and Obesity has emerged as one of the most important Public Health Problem escalating to be a global pandemic.[1] Obesity is the most prevalent form of malnutrition and it is a global concern.[2] Obesity is a worldwide problem affecting all levels of society and thus is being described as a global epidemic. World Health Organization defines Overweight and Obesity as abnormal or excessive fat accumulation that may impair health.[3] The Practical and clinical definition of Overweight and Obesity is based on Body Mass Index. Over weight is defined as BMI over 25kg/$m^2$ and Obesity as BMI over 30kg/m2.3In 2014, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 600 million were obese.39% of adults aged 18 years and over were overweight in 2014, and 13% were obese.[4] Globally India was recently ranked third place in obesity.[5] There are around 30 million obese people in India and more who are overweight. One in five Indians are either overweight or obese. The latest NFHS[6] found that 9 % of men and 15% of women are overweight and obese. In India Punjab ranks first with 30.35% male and 37.5% female are

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being overweight or obese. This number seems a small size in the International Population because of the sheer size of India's Population. Tamil Nadu ranks fifth among Indian states with Overall Prevalence of 19.8% in Males and 24.4% in females. Since adolescent is a period of transition from child hood to adulthood, overweight and obesity is confined not only to adults but also being reported among the children and adolescents of both sexes of developed as well as developing countries.[7] Over weight and Obesity is due to chronic imbalance between actual energy needs and energy intake of body.[8] The etiology of this is multi factorial. The Most important consequence of childhood obesity is its persistence into adulthood with all its health risks intact. Overweight and Obesity is not an immediately lethal disease by itself, but these are the major contributors to the global burden of many diseases. It is associated with five out of ten leading cause of death and disability such as Type 2 Diabetes Mellitus, Hypertension and Cancer9. Besides this obesity also serves as a risk factor for many diseases like Gall bladder disease, hypercholesterolemia, mental health and Orthopedic disorders.[9]

**Aims & Objectives**

1. To find out the prevalence of overweight/obesity among adolescents in a rural area of Kanyakumari District
2. To find out the association between overweight and obesity with its modifiable and non-modifiable risk factors

**Material & Methods**

Study Design: Cross- sectional study

Study Subjects: Adolescents aged 10-19 years of both sexes

Study Area: Study was conducted in Thiruvattar block panchayath of Kanyakumari District.

Study Period: March 2021- May 2022

Sampling Method: Multi Stage Random Sampling.

**Sample Size**

Based on a study conducted by Ponni syamala et al[10] about health status in selected districts of Tamilnadu had shown that prevalence was 18% in Thirunelveli, 23% in Madhurai, 17% in Thiruchirapalli, 22% in Salem. Therefore considering the average prevalence as 20 sample was calculated using the formulae

$$n= 4pq/d^2$$

Where p is the prevalence of overweight / obesity(20%)

$q = 100-p$

$d^2$ = relative error (20% of p)= $(20\times 20/100)^2$

by substituting the values in the above equation

$n = 4\times20\times( 100-20)/4^2$

**n= 400**

**Sample Selection**

First stage by simple random sampling Thiruvattar block area was selected .The list of all village panchayaths obtained from Thiruvattar Block office.

Second Stage by simple random sampling five village panchayaths in the block area was selected. The selected village panchayaths are Aruvikkari, Cherukole, Kumarnkudi, Pechiparai, Yettacode.

Third stage – Study subjects were recruited by house to house visit. At each village all the streets and roads were listed out and allotted numbers are given. Using this four streets or roads were selected randomly using lot method. Starting from the first house each house was

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visited and adolescents present were invited to present in the study.10 adolescents were included in the study from each road or street. If the end of the road or street was reached without finding 10 adolescents the house visit was continued up to the adjacent street or road.

**Inclusion Criteria**

- Adolescents aged 10 -19 years of both sexes.
- Permanent residents of the selected area

**Exclusion Criteria**

- Adolescents who are diagnosed any chronic diseases / any hospitalization within 6 months.
- Those who are on Antipsychotic drugs / anti-depressant drugs / Hormone therapy
- Those who are absent on 3 occassions.

**Parameters Studied**

Height, Weight, Body Mass Index, Waist Circumference, Hip Circumference Waist Hip Ratio.

**Data Entry and Analysis**

Data was entered in Microsoft excel spreadsheet and analyzed using SPSS Version 21. Chi-square was used to find out the association between the factors influencing overweight and obesity. Logistic regression model was used to find out the most important factors influencing this.

**Results**

A cross sectional study was conducted on overweight and obesity among adolescents (10-19 years) in a rural area of Tamil Nadu. Among 400 subjects studied 61.5% of the study population belonged to 13 to 17 years, 22.3% where less than 12 years of age &16.3% adolescents belonged to >18 years. Prevalence of overweight and obesity in the study population was assessed by using WHO BMI Classification. As per the present study the prevalence of overweight is 8.5% (34) and obesity is 5.8%(23). About 65% of the study population were of normal weight and 20.8% were underweight. Out of the 199 adolescent females 22(11.1%) were overweight, 18(9%) were obese. In 201 adolescent males 12(6%) were overweight and 5(2.5%) are obese. About 122(61.3%) females and 138 males (68.7%) are in normal weight, 37 (18.6%) females and 46(22.9%) were underweight. Out of 400 adolescents normal waist hip ratio in 286(71.5%) adolescents, 114(28.5%) had abnormal waist hip ratio.114 adolescents are having abnormal waist hip ratio among this 80(40.2%) were females and 34(16.9%) males. Among 286 normal waist hip ratio adolescents 119(59.8%) were females and 167(83.1%) males. Among 400 adolescents physical activity is in adequate for 171(42.8%) and 229(57.3%) having adequate physical activity. Many of the adolescents ie 385(96.3%) were consuming non vegetarian and only 15 (3.8%) vegetarians.165 adolescents used to take up to 4 glasses of water daily, 219 takes 5 to 8 glasses of water and 16 adolescents takes more than 8 glasses of water per day.

**Table 1: Distribution of study population according to frequency of consumption of food items**

| FOOD / FREQUENCY | Butter & cheese | Egg | Milk | Chicken | Redmeat | Bakeryitems | Junk foods |
|---|---|---|---|---|---|---|---|
| Never | 15(338.3%) | 5(1.3%) | 5(1.3%) | 29(7.3%) | 116 (29.0%) | 100 (25.0%) | 183 (45.8%) |
| Once a month | 134(33.5%) | 23(5.8%) | 5(1.3%) | 133(33.3%) | **206 (51.5%)** | 99 | **154** |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | (24.8%) | **(38.5%)** |
| Once a week | 93 (23.3%) | 109 (27.3%) | 12 (3.0%) | **211 (52.8%)** | 76 (19.0%) | 98 (24.5%) | 56 (14.0%) |
| Once in three days | 13(3.3%) | **179 (44.8%)** | 19 (4.8%) | 20(5.0%) | 2 (0.5%) | 98 (24.5%) | 5(1.3%) |
| Daily | 7(1.8%) | 84 (21.0%) | **359 (89.8%)** | 7(1.8%) | | 5 (1.3%) | 2(0.5%) |
| Total | 400 | 400 | 400 | 400 | 400 | 400 | 400 |

Out of 400 adolescents 359(89.8%) consumes milk daily , 211 (52.8%) consume chicken once in a week , 206(51.5%) consumes red meat once in a month ,154 (38.5%) consumes junk foods once in a month and 179(44.8%) adolescents takes egg once in three days [Table 1].

**Table 2: Prevalence of overweight and Obesity in sample according to Gender**

| Sex | BMI Status | | Total |
|---|---|---|---|
| | Over weight/ Obese | Normal/Under weight | |
| Male | 17 (8.5%) | 184 (91.5%) | 201 (100%) |
| Female | 40 (20.1%) | 159 (79.9%) | 199 (100%) |
| Total | 57 (14.2%) | 343 (85.8%) | 400 (100%) |

$\chi^2$ =11.093 df=1 p=0.001

20% of females are overweight and obese compared to males were overweight and obesity is 8.5%, the finding is statistically significant [Table: 2].

Prevalence of overweight and obesity were more common among those who consume junk foods once a week (33.9%), 14.9% and 6.6% (Table :4) among who consume junk food once an month and never consume junk foods and the result was found to be statistically significant.29.8% were overweight and obese among inadequate physical activity group compared with 6.8% among adequate physical activity group and difference was found to be statistically significant .Overweight and obese are more in abnormal waist hip ratio group(41.2%) compared with normal group(3.5%) and its statistically significant.

**Logistic Regression**

The factors that were found to be statistically associated with overweight and obesity in chi square were also analyzed using binary logistic regression. The dependent variable considered for the analysis was overweight and obesity. This was analyzed with a set of independent variable and enter method of logistic regression was used. The factors which were found to be statistically related with overweight and obesity in logistic regression were as follows.

**Table 3: Binary logistic regression analysis**

| Independent Variables | B | S.E. | p | OR | 95% C.I. for OR | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| Age | 0.154 | 0.55 | 0.78 | 1.167 | 0.397 | 3.431 |
| Sex | 0.842 | 0.402 | 0.037 | 2.32 | 1.054 | 5.105 |
| School | 1.157 | 0.416 | 0.005 | 3.18 | 1.408 | 7.182 |
| Education | 0.805 | 0.436 | 0.065 | 2.238 | 0.952 | 5.26 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| Socioecnomic status | 0.462 | 0.455 | 0.31 | 1.588 | 0.65 | 3.876 |
| WHR | 2.432 | 0.426 | 0 | 11.383 | 4.938 | 26.239 |
| Physical activity | 0.245 | 0.405 | 0.001 | 2.656 | 0.857 | 3.339 |
| Skip breakfast | 0.095 | 0.372 | 0.798 | 1.1 | 0.531 | 2.279 |
| Habit of taking food in between the meal - Once a week or higher | 0.389 | 0.44 | 0.377 | 1.475 | 0.623 | 3.496 |
| Red meat | 0.212 | 0.435 | 0.626 | 1.236 | 0.527 | 2.9 |
| Junk foods | -0.763 | 0.451 | 0.091 | 0.466 | 0.193 | 1.129 |
| Constant | -7.724 | 2.569 | 0.003 | 0 | | |

Regression equation $z=B_0+B_1X_1+B_2X_2=B_3X_3+\ldots..B_KX_K$

Sex, type of school, educational status, socio economic status waist hip ratio , skipping breakfast ,physical activity , food in between the meal were significantly associated with overweight and obesity.

**Discussion**

65(16.3%) of the adolescents in the study population were aged >18 years, 89(22.3%) were <12 years, those aged 13-17 years 246 (61.5%) accounted for majority of subjects. Out of the 400 adolescents males constituted majority 201(50.3%) followed by females 199 (49.8%). Shashidar kotian et al[11] also found males constituted majority of 51.2% followed by females (48.7%) . Out of the 400 adolescents 219 (54.8%) were Hindus, 149 (37.3%) were Christians and 32 (8%) were Muslims. Most of the adolescents belonged to nuclear families 87.8% followed by joint family 12.3% and no extended family in the study. In our study adolescent group were classified according to modified kuppuswamys classification. 211 (52.8%) adolescents belonged to upper lower class, 123(30.8%) belonged to lower middle class , 54 (13.5%) belonged to upper middle class, 12(3%) of adolescents belonged to upper socioeconomic class and no adolescents belonged to lower class Most of the adolescents 52.8% attended private schools, 47.3% government schools. There was no illiterate in the study population .Most of the adolescents belonged to high school(46%) and higher secondary(27.5%)The study revealed a prevalence of 8.5% over weight and 5.8% obese among adolescents. Underweight constitute 20.8% of the study population. Lower prevalence was reported by Ambili remesh et al[12] who indicated that prevalence of overweight and obesity to be 8.75% and 4.82% respectively and Goyal et al[13] in surat city reported the prevalence of overweight and obesity was found to be 6.55% and 13.9%Kapil et al[14] found the prevalence of overweight and obesity of about 25% and 7% which was higher than the prevalence seen in the present study. Sony jagadesan et al[15] and khadilkar et al16 in Chennai also found very high prevalence of overweight and obesity i.e.18.1% and 21.2% respectively. Studies from south India revealed that the prevalence of overweight and obesity was very high ranging from 11% to 25% than the prevalence of present study. The age of the adolescents ranged from 10 to 19 years. The study find a significant association between age and prevalence of overweight and obese, as age increasing prevalence of overweight and obesity increasing. Anita rani et al[17] revealed that a significant association between age group and obesity. In the Present study 20% of females are overweight / obese and 8.5% males are overweight/obese which was statistically significant. Both Naresh pal sing et al[18] and Anitha rani et al[17] found that females are more obese than males and the difference was statistically significant. In the present study Overweight and obesity was more common among upper and upper middle class and association was statistically significant. Naresh et

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al18 found that prevalence of overweight/obese was high in high socioeconomic status and statistically significant .Similar findings in Avula laxmaiah et al[19] and supreet kaur et al.[20] Prevalence of overweight / obesity was higher in private schools 21.8% compared with 5.8% in government schools and was statistically significant. Sony jagadesan et al[15] found the similar findings with 21.4% in private schools compared to 3.6% in governments schools. Avula Laxmaiah et al[19] also found a significant relationship between private schools and overweight / obesity. There was a significant association between food in between meals and obesity Overweight / obesity was more in those who are taking food in between meals similarly shiny George et al[21] found that there was an significant association between food in between meals and obesity. All overweight / obese subjects in the study are non-vegetarians and no significant association was found but Kavitha Sree et al[22] found that prevalence of overweight and obesity to be significantly associated with non –vegetarians. Overweight and Obesity was more in those who are consuming red meat and junk foods for once a week or more and the association was statistically significant. overweight and obesity was significantly associated with study subjects who are having abnormal waist hip ratio.

**Limitations**

1. Causal relationships cannot be obtained since the study was cross sectional survey.
2. Recall bias about the dietary habits may have confounded some of the results.
3. Dietary pattern was based on frequency of intake not the quantity of intake

Financial Support & Sponsorship: Nil

Conflict Of Interest: There are no conflicts of interest.

**Conclusion**

Overweight and obesity are more common in females, high socio economic status, those with inadequate physical activity and who are consuming junk foods.

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