

Original Research Article

A cross sectional study on the precocious puberty among girls in the age group of 11-15 years, in two schools in Kollam

Jeffy Binu^{1*}, Sonia Raichel Thomas²

¹Assistant Professor in Statistics, Department of Community Medicine, ²Junior Resident, Azeezia Institute of Medical Sciences and Research, Meeyannoor, Kollam, Kerala, India

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*Correspondence:

Jeffy Binu,

E-mail: jeffy.binu@gmail.com

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ABSTRACT

Background: Puberty is the period during which human development progresses, from the first pubertal sign to full sexual maturation. Precocious puberty is a common problem affecting up to 29 per 100 000 girls per year. The objective of this study is to find out the prevalence of precocious puberty among school going girls and to find out relation with various risk factors.

Methods: A cross sectional study was conducted by enrolling 250 school going girls by selecting one school each from urban and rural setup. Prevalence of precocious puberty was expressed in percentage and Chi square test was applied to check association. P value for statistical significance was fixed at $P < 0.05$.

Results: The prevalence of precocious puberty was found to be 10.4%. In urban it was found to be 12.35% and in rural it was 8.43%. Girls whose fathers have primary education are risky to have precocious puberty ($P < 0.049$). Those students who take fish occasionally, that is once or thrice in a week were more prone to have precocious puberty ($P < 0.000$). Prevalence of Precocious puberty is more in rural area when compared to urban area. Parents, especially fathers who were less educated should take care of their daughter's health by not giving them dried and junk foods. It is better to take fish daily, rather than once or thrice in a week, occasional consumption of fish is found to be a reason for precocious puberty.

Conclusions: Prevalence of Precocious puberty was 10.4%. Fathers of the girls, who are not well educated and occasional fish consumption of girls was found to be the significant reason for Precocious puberty.

Keywords: Precocious puberty, Girls, Father, Rural, Urban

INTRODUCTION

Puberty occurs when a child develops into an adolescent. Precocious puberty results mostly from the precocious activation of the gonadotropic axis. Precocious puberty is defined as the precocious onset of pubertal manifestations in boys or girls. Puberty in girls begins when the body starts producing hormones that direct bone and breast growth, grow pubic hair, and cause ovum to ripen and be released from the ovaries. Precocious puberty is the

appearance of appropriate secondary sexual characters before the age of 8 years in girls and menarche before 10 years of chronological age.

Precocious puberty currently affects 1 in 5,000 children and is 10 times more common in girls. Statistics indicate that girls in the United States are maturing at an earlier age than they did 30 years ago and the number of girls with diagnosed precocious puberty is on the rise. Recently a research conducted suggests that early maturity girls are at a risk of stronger negative peer

influences.¹ A survey in China on the current status of pubertal development of Chinese children, gave a report that there is a positive association between obesity and precocious puberty. It showed that breast development before 8 years was observed in 2.91% of girls. Prevalence of precocious puberty among girls was 0.43%.² It was found that increased rates of childhood obesity have led to dramatic increase in precocious puberty in girls.³ In India, across cities and towns, girls are reaching puberty faster than before. The age of attaining sexual maturity among girls in urban India has dropped to 11 from 13. The reverse is true in rural India, where girls are reaching puberty even later than 13.

Low menarche age was independently associated with high calorie consumption, high protein diet, more coffee intake, low physical activity and parents' low educational background. According to this study, the mean age at menarche was 13.9±1.2 years (95%CI, 13.8-14.0). The menarche ages ranged between 10 and 12 years for 10.5%, 13 and 14 years for 54.5%, and 15+ years for 35%.⁴

It was proved that there was a significant difference in age at menarche between urban and rural girls over time, with urban girls having their menarche earlier than rural girls.⁵

Socio economic status also plays a role in the occurrence of Precocious puberty according to a study.⁶

But most of the scientists argue that that exact cause of precocious puberty has not been found out till now. Majority think that the cause is idiopathic. Some studies have proved that secular trends are also a main cause of precocious puberty.^{10,12} Various studies conducted shows that factors like obesity, consumption of junk food, lack of physical exercise, diet habits, low socio-economic status and education of parents has a major role in development of precocious puberty.

METHODS

The objective of the study was to find the prevalence of precocious puberty among school going girls in the age group of 11-15 years, to find out if there is any difference in the occurrence of Precocious puberty in urban and rural set-up and to find out relation with the risk factors. A cross sectional study was conducted by selecting one schools each from urban and rural in Kollam district. The school going girls who have attained puberty (menarche) and who were in the age group of 11-15 years was selected as study subjects. The study was conducted in the month of July to September 2014. Precocious puberty was defined as the girls who have attained puberty (menarche) before the completion of 11 years. The sample size was calculated with a power of 80%.¹³ A simple random sample of 500 subjects was selected by taking 251 students from urban and 249 students from the rural area. Stratified random sampling techniques was

applied for selecting students from each class considering the class as one strata and a simple random sample of specific students were selected from each class by using proportional allocation. The names of the girls were selected from their Roll book. The data was collected using self-administered questionnaire, which includes all the variables under study. In order to assess obesity, the Body Mass Index was found out. Weighing machine and measuring tape was used to measure the weight and height of students respectively.

BMI was categorized as follows:

Body Mass Index (BMI) = Weight (kg)/Height (m²)
 BMI <18.5 = Underweight
 BMI between 18.5 -24.5 = Normal
 BMI > 24.5 = obese

Socio economic status was categorized according to revised modified BG Prasad socioeconomic classification scale, January 2014.

Table 1: Revised modified BG Prasad socioeconomic classification.

Socio economic class	Per capita monthly income
Upper class	4860 and above
Upper middle class	2406-4859
Middle class	1424-2405
Lower middle class	737-1423
Lower class	Less than 736

It is calculated as total income divided by number of family members.

The data collected was compiled, coded and entered in Microsoft Excel. The data was further analyzed in EZR, version 1.32. Tests like Student's t independent sample test, chi square tests and analysis of variance were used for analyzing the data. The students as well as their parents were informed about the study and consent was obtained from the students and the principal of the respected institution before data collection.

RESULTS

A total of 500 students were interviewed. 249 students were selected from rural and 251 students were selected from urban setup. The students of classes' 6 to 10 standard were included in the study. The risk factors assumed were obesity, consumption of junk food, lack of physical activity, high socio-economic status, education of father and mother, diet habit and consumption of meat, fish and egg.

The prevalence of precocious puberty was found to be 10.4 %, in rural it was 8.43% and in urban it was found to be 12.35% (Table 2). The mean age of first menstruation

was 10.86 years. In rural area it was 10.88 years and in urban setup it was 10.84 years.

Table 2: Prevalence of precocious puberty with residing area of students.

Age of first menstruation	Rural	Urban
Above 11 years	228 (91.5%)	220 (87.6%)
Below 11 years	21 (8.4%)	31 (12.3%)
Total	249	251

The occurrence of precocious puberty was not found to be significantly different in urban and rural setup ($P < 0.391$).

Underweight was found to be more in urban area and pre obese group was found to be more in rural area. BMI was not found to be significant with the occurrence of precocious puberty ($P < 0.528$).

Socioeconomic status was not found to be significantly associated with the occurrence of precocious puberty ($P < 0.451$), the number of girls attaining precocious puberty

in lower class, lower middle class and upper middle class is almost same.

Education of father was found to have significant relationship with precocious puberty ($P < 0.049$), those girls whose father having primary education, is more risky to attain precocious puberty than those, whose fathers are graduates and attained higher secondary education.

Factors like Education of mother ($P = 0.277$), occupation of father ($P = 0.559$), occupation of mother ($P = 0.067$), consumption of junk food ($P = 0.429$), diet habit ($P = 0.819$) and physical activity, ($P = 0.097$) was not found to be significantly related with precocious puberty.

Consumption of fish is considered to be a significant factor for the occurrence of precocious puberty ($P = 0.000$). Nearly 30% of girls who attain precocious puberty consume fish once in a week, 15% of girls who consume fish thrice in a week had precocious puberty.

Egg consumption was not considered to be the significant factor for the occurrence of precocious puberty ($P = 0.809$).

Table 3: Association of various variables with precocious puberty.

Variables	Chi-square value	Degrees of freedom	P-value
Place of residing	2.058	1	0.151
Socio economic status	11.932	12	0.451
Education of father	6.051	2	0.049
Occupation of father	2.066	3	0.559
BMI	0.297	2	0.862
Junk food Consumption	0.625	1	0.429
Fish consumption	32.859	4	0.000
Type of physical activity	7.844	4	0.097
Rural Population			
Education of father	1.226	2	0.542
Occupation of father	3.214	3	0.360
BMI	2.086	2	0.352
Junk food Consumption	1.340	1	0.247
Fish consumption	2.376	4	0.667
Egg Consumption	12.768	4	0.012
Type of physical activity	7.622	4	0.106
Urban Population			
Education of father	7.344	2	0.025
Occupation of father	1.839	2	0.607
BMI	1.205	2	0.904
Junk food Consumption	0.135	1	0.713
Fish consumption	37.307	4	0.000
Egg Consumption	4.079	4	0.395
Type of physical activity	9.485	4	0.05

In general, education of father, socioeconomic status and fish consumption was found to be significant with the

occurrence of precocious puberty. In the rural population, egg consumption was found to be significant. In the

urban population, education of father, fish consumption and type of physical activities were found to be significant.

Consumption of vegetables is considered to be the significant risk factor for the occurrence of precocious puberty ($P=0.043$). Nearly 15% of girls who consume vegetables whenever it is prepared at home have attained precocious puberty association of these variables with precocious puberty is shown in (Table 3).

Table 4: Education of father.

Education of father	Rural	Urban
Primary	15	4
Higher secondary	101	80
Graduate and above	133	167

Table 5: Fish consumption (in a week).

Fish consumption	Rural	Urban
Daily	129	121
Once	24	33
Twice	35	34
Thrice	47	40
None	14	23

Table 6: Physical activities.

Type of physical activity	Rural	Urban
Jogging	16	11
Swimming	4	1
Playing badminton	107	137
Outdoor games	99	85
None	23	17

Comparison between urban and rural: Education of father was found to be a significant factor for precocious puberty in urban area ($P < 0.025$) but not in rural area ($P < 0.542$), (Table 4). Fish consumption was found to be a significant factor in urban area ($P < 0.000$) but in rural area it was not found to be significant ($P < 0.667$), (Table 5). Consuming vegetables was found to be significant with precocious puberty in urban area ($P < 0.01$) but not found in rural area ($P < 0.897$). There was relationship between type of physical activity and the occurrence of precocious puberty in urban area ($P < 0.05$) but was not found to be significant in rural area ($P < 0.106$), (Table 6). Egg consumption was found to be significant in rural area ($P < 0.012$) and it was not found to be significant in urban area ($P < 0.395$).

DISCUSSION

According to study conducted in Birmingham, it was found that 16% of the girls were found to have precocious puberty.¹ In our study, we got the prevalence as 10.4%. The quoted study was conducted in a

developed country and our study got less prevalence which may be due to variation in diet habits, physical activities or socio economic status compared to the referred study.

In a similar study in China, prevalence of precocious puberty was 0.43%, much less as compared to our study.² May be in China awareness about physical activity and healthy diet may be given to girls of this particular age group.

According to studies, there is an influence of obesity on the timing of puberty.^{2,3,7,9} In our study, obesity and precocious puberty was found to be insignificant. Majority of the students is in the normal range of BMI. Only 4 were in the pre obese category. This may be because of genetic factor of students.

In a study conducted in Ethiopia, it was found that low menarche age was associated with high calorie consumption.⁴ In our study, it was found to be insignificant both in rural as well as in urban setup. This may be because of reduced frequency in the consumption of junk food in Kerala as compared to other parts of the country. Due to high educational status in Kerala, people are aware about the adverse effects of junk food consumption and will try to avoid it to some extent.

In a study conducted in Ethiopia, it was found that high protein consumption may lead to lower menarche age.⁴ In our study, fish consumption was found to be significant ($P < 0.000$), the girls who take fish once and thrice in a week are more prevalent to have precocious puberty with a prevalence of 29.8% and 14.9% respectively. Since they are taking once or thrice in a week the quantity they take may be more, which leads to precocious puberty. Daily minimum consumption of fish will not lead to precocious puberty.

In a study conducted, low physical activity was found to be significant.⁴ In our study physical activity was not found to be significant with precocious puberty, children are forced to be in the home itself due to the heavy workload from schools.

In a study conducted in Ethiopia, it was found that parents' low educational background was found to be significant.⁴ In our study education of father was found to be significantly related with precocious puberty. Those girls whose fathers having primary education were more prevalent to have precocious puberty than those whose fathers were graduates. Similar to the quoted study low educational status of fathers is associated with the occurrence of precocious puberty for their daughters. This may be because here in most of the families, father's used to bring some snacks for their children when they go outside for job, fathers who are having low education may not be knowing that fried food items and high calorie food would spoil their child's health.

According to a study, there was a significant difference in age at menarche between urban and rural girls over time, with urban girls having their menarche earlier than rural girls.⁵ In our study also we got the same result with prevalence as 12.4% in urban and 8.4% in rural setup but it was not found to be significant. An increase in the urban setup may be due to reduced physical activities, high socioeconomic status and the pressure of vast syllabus in the students in the urban setup.

According to studies socioeconomic statuses play an important role in lower menarche age.^{4,6} In our study, socio economic status was not found to be significantly related with precocious puberty, may be Kerala is of highly privileged state that irrespective of socio economic status, families will care their children and provide good food and education.

CONCLUSION

This study was conducted to find out the prevalence of precocious puberty among girls of classes 5th to 10th standard in two schools in Kollam, one in rural and the other in urban setup and also to find the associated risk factors. Based on our study, 10.4% (52 out of 500) were under the category of precocious puberty, in which 12.4% (31) belong to the urban and 8.4% (21) belong to the rural setup.

The significant factors associated with precocious puberty were education of father and fish consumption. There was increased prevalence of precocious puberty in the urban setup (but was not significant with its occurrence) and we got education of father, fish consumption and physical activities in urban setup as the significant factors

In rural setup, only egg consumption was found to be significant with occurrence of precocious puberty.

Other risk factors like junk food consumption, BMI, occupation of parents etc. was found to be insignificant both in rural as well as in urban setup.

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