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Age of Menarche and Its Relation with Nutrition, Socio-Economic Status and Diet in School Girls of Kolhapur City, Maharashtra

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Abstract

Menarche is the onset of menstruation and is the manifestation of puberty among girls. This study was conducted to find out relation of age of menarche with nutrition, socio-economic status and diet in school girls of Kolhapur city. For this cross sectional observational study of longitudinal type, data was collected from 1041 school girls of Kolhapur city age between 9-15 for period of two years, May 10 - May 12. Data was collected from one urban school (500 girls) and two schools from slum area (541 girls) representing high socio-economic (HSE) and low socio-economic (LSE). Detailed information was collected with the help of questionnaire involving age of menarche, parity, family size, parent's education, their occupation, diet, exercise. Economic status was established on the basis of parent's education, profession with reference to Kuppuswami classification. Data was entered in computer and analyzed statistically. Mean age of menarche in high socio-economic status was 11.6 years. Mean age of menarche in low socio-economic status was 12.3 years. There was no co-relation between age of menarche and dietary habits. Also this study showed statistically significant association with body mass index and socio-economic status. The high socio-economic status shows early age of menarche and low socio-economic status shows late age of menarche. Study is useful for planning of RCH (Reproductive and Child Health) program to give guidelines to girls who have attained menarche in the form of sanitation, health education, sex education and social responsibility.

Keywords: *Age of Menarche, Nutrition, Socio-economic status, School girls, Kolhapur city.*

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I. Introduction

Adolescence refer broadly to the phase in human development encompassing the transition from childhood to adulthood. The period extends from 10-19 yrs. which includes development also. This period is very crucial since these are formative years in the life of an individual. Future of society depends on adolescence and they are the great human resources for the society.**(1)**

Puberty is a process leading to physical and sexual maturation. Puberty in girls begins between 8-14 yrs of age. Menarche is the onset of menstruation and is the manifestation of puberty among girls.**(2)** Menarche is influenced by genetic, environmental and socioeconomic factors.**(3)** BMI is most commonly used measure of overall adiposity or under nutrition. **(4)**

Early menarche is associated with increased risk of breast cancer, obesity, endometrial cancer and uterine leiomyomata. Age of menarche may relate to subsequent reproductive performance such as age of first intercourse, age of first pregnancy and risk of subsequent miscarriage.**(5)**

Aim of our study is to asses age of menarche and its relation with socio-economic status, nutrition and diet in school girls of Kolhapur city.

II. Material And Method

Material - Weighing machine, measuring tape, ruler, Proforma.

Method – **Cross sectional observation study of longitudinal type.**

Sample size – 1041 girls from schools of Kolhapur city, age between 9-15 years.

Period of data collection – 2 years from May 2010 - May 2012.
Data was collected from one urban (500girls) and two schools from slum area (541girls). Written consent was taken from principal of school and parents as the students were minors. Data collected with questionnaires, measurement of height and weight, calculation of body mass index with formula BMI = weight in kg / (height in m)^2
Socio-economic information was collected in the form of parent's education, income per month and occupation. Using Kuppuswami's classification, the income groups were divided into upper (UPP), upper middle (UM), lower middle (LM), upper lower (UL), and lower (LL).

- UPP, UM, LM – higher socio-economic group
- UL, LL – lower socio-economic group

Collected data was analyzed statistically on computer software SPSS version 15.00.

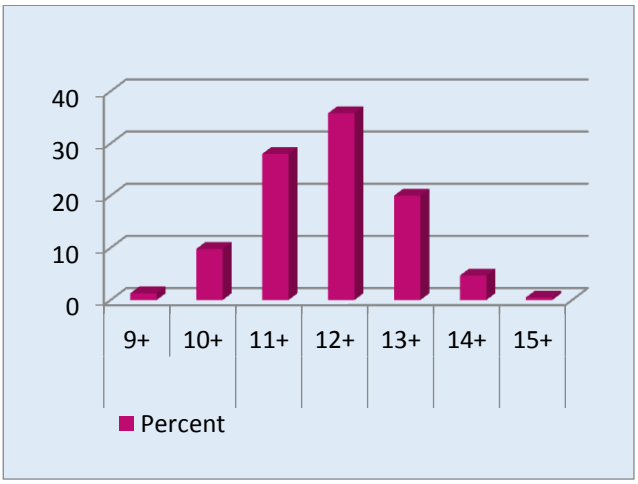
III.Observations And Results

Table 1: Frequency of Menarche attained girls

Menarche	Frequency	Percent
No	426	40.9
Yes	615	59.1
Total	1041	100.0

Table 2: Age distribution of menarche

Menarcheal age group	Frequency	Percent
9+	8	1.3
10+	60	9.8
11+	172	28.0
12+	220	35.8
13+	123	20.0
14+	29	4.7
15+	3	0.5
Total	615	100



Graph 1: Distribution of age of Menarche

- Table shows max. no of cases in 11 to 13 years so the range of menarche in our population is 11 to13 years.
- Graphical presentation shows distribution of cases which are occurring at earlier age. The trend is decreasing and shifting towards the left of the axis.

Table 3: Frequency distribution of BMI class with mean age of menarche

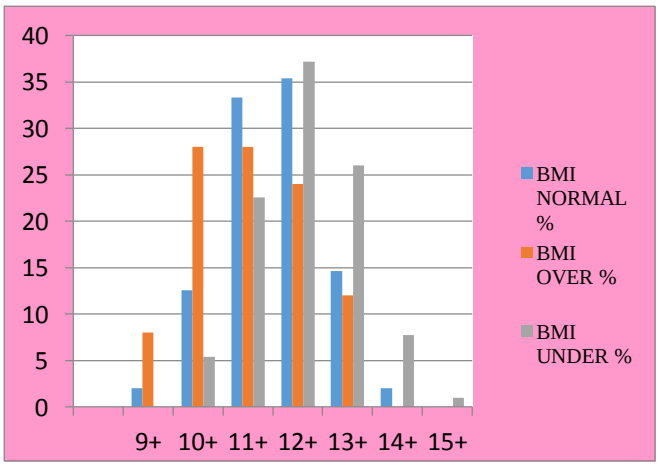
BMI class	Frequency	percent	Mean age of menarche
Normal range	294	47.8	11.54 (1.02)
Over weight	25	4.1	11.04 (1.17)
Underweight	296	48.1	12.11 (1.05)

Total	615	100.0	

Table shows mean age of menarche is less in over weight individuals while age of menarche is more in underweight individuals as compared to normal range group.

Table 4: Distribution of age of menarche in different BMI classes

Menarcheal age	BMI class						Total
	Normal range		Over wt		Under wt		
	No.	%	No.	%	No.	%	
9+	06	2.04	02	08	00	00	08
10+	37	12.58	07	28	16	5.4	60
11+	98	33.33	07	28	67	22.6	172
12+	104	35.37	06	24	110	37.16	220
13+	43	14.62	03	12	77	26	123
14+	06	2.04	00	00	23	7.77	29
15+	00	00	00	00	03	1.01	03
Total	294 (47.8%)	100	25 (4.1%)	100	296 (48.1%)	100	615



Graph 2: Distribution of age of Menarche & BMI

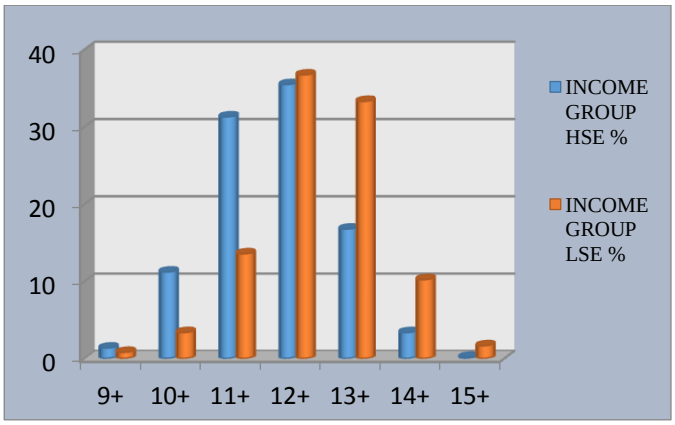
Table and Graph shows distribution of menarcheal age group with different BMI classes. In this overweight class are less numbers but their age of menarche falls at an early age upto 9 years. Underweight class shows maximum number of cases at the age of menarche upto 12 to 13 years of age. Normal range of BMI falls in 11 to 12 years of Age.

So the nutrition affects the age of menarche.

Chi square test value 62.702 and df is 12. The P value is <0.05 which is statistically significant.

Table 5: Distribution of menarcheal age in both income group (HSE & LSE)

Menarcheal age	Income group				Total
	HSE		LSE		
	NO	%	NO	%	
9+	07	1.40	01	0.85	08
10+	56	11.24	04	3.41	60
11+	156	31.32	16	13.6	172
12+	177	35.50	43	36.75	220
13+	84	16.80	39	33.33	123
14+	17	3.4	12	10.25	29
15+	01	0.20	02	1.70	03
Total	498	100	117	100	615



Graph 3: Distribution of age of Menarche & socioeconomic status

Table and graph shows distribution of menarcheal age with income group here in HSE group maximum number of cases have age of menarche up 12 years of age (mean age of menarche is 11.6 In LSE maximum number of cases fall upto 12 to 13 years of age (Mean age of menarche is 12.3) Chi square test value is 43.43 and df is 6. The P value is <0.05 which is statistically significant.

Data entered and coded using Microsoft excel. Categorical data was expressed in groups and continuous data was expressed as Mean ± SD. We used chi-square test to check the association between two groups and independent t test used to compare mean difference between two groups. Data was analysed using SPSS version15.00.

Table 6: Distribution of menarcheal age in various types of diet

Menarcheal age	Diet				Total
	Veg		Non-veg		
	No.	%	No.	%	
9+	2	25	6	75	08
10+	10	16.7	50	83.3	60
11+	23	13.37	149	86.63	172
12+	35	15.91	185	84.09	220
13+	24	19.51	99	80.49	123
14+	5	17.24	24	82.76	29
15+	2	66.67	1	33.33	3

P=0.2361

We checked the association between age group and diet. There was more number of subjects which were non-vegetarians in all the age groups as compared to vegetarians (except age group 15+). We have not found any association between menarche age and diet (*p=0.2361).*

Out of 615 subjects 514 were non-vegetarians with mean menarche age 12 years 2 months (12.15±1.04) and 101 subjects were vegetarians with mean menarche age 12 years 3 months (12.28±1.17). The difference between two means was around 1.5 month and that difference was not statistically significant.

IV. Discussion

Table 7: Age of menarche (in years) in different studies in various parts of world

Studies	Mean age of menarche (years)
JI-YOUNG KI et al (KOREA)	12.7
MARYAM ASGHARNIA et al (NORTHERN IRAN)	12.9
ROSE E. FRISCH et al (U.S.A.)	12.9
KESHAVARZI F. et al (KERMANSHAH CITY)	13.4
PARVIN DOKHT BAYAT et al (IRAN)	13.21

The studies conducted outside India also shows mean age of menarche is decreasing and is comparable with our study. Diptendu Chatterjee et al also studied mean age of menarche in santal girls of Jharkhand and found it out to be 11.4 years. Mean age of menarche in our study is comparable with other studies conducted in India and shows downward trend.

Comparison of BMI

Depending upon BMI, all the individuals were categorized into normal range (18.5-24.99), underweight (<18.5) and over weight(>25)

Table 8: Age of menarche and BMI

BMI class	Frequency	percent	Mean menarcheal age
Normal range	294	47.8	11.54(1.02)
Over weight	25	4.1	11.04(1.17)
Under weight	296	48.1	12.11(1.05)
Total	615	100.0	

Menarche is earlier in overweight girls as compared to normal weight and underweight girls as per Korean study and early menarcheal girls show higher BMI. In Poland, Iwona Wronka[(4)] studied and concluded that there is inverse correlation between BMI and age of menarche. In a study at Iran, Parvin Dokht Bayat [(3)] et al also concluded that age of menarche is inversely related to BMI, nutritional status and weight.

Comparision of socio-economic status

Table 9: age of menarche & socioeconomic status

Studies	Socioeconomic status	
	HSE	LSE
SHOBHA RAO et al	12.1	15.4
AMRITA BAGGA et al	12.16	13.16
PRESENT STUDY	11.6	12.3

In study conducted by Shobha Rao,[(6)] she concluded that, the girls from LSE group not only had less height, weight and body fat but also had significant difference in menarcheal age(15.4 years) as compared to girls from HSE(12.1years)

In a study by Amrita Bagga,[(7)] the trend of lower age of menarche was well found when moving from LSE to HSE group. ICMR studies also revealed that mean menarcheal age steadily increases with decrease in per capita income.

Keshavarzi F[(8)]. also stated that decreased age of menarche is due to higher socioeconomic state and is not related to somatic characteristics like height, weight and BMI.

Comparision of diet – veg and non-veg

Out of 615 subjects 514 were non-vegetarians with mean menarche age 12 years 2 months (12.15±1.04) and 101 subjects were vegetarians with mean menarche age 12 years 3 months (12.28±1.17). The difference between two means was around 1.5 month and that difference was not statistically significant. There was no co-relation between age of menarche and diet. [(9)]

Studies on children and adolescents have generally found that optimal growth can be achieved by a vegetarian diet [(10)]

Adult BMI is lower in vegetarian than non-vegetarian. The mean menarcheal age for those who consume more fatty and protein food is 13.52 years where as those consuming vegetarian diet is 14.1 years [(11)]

V. Conclusion

- Mean age of menarche in high socioeconomic status was 11.6 yrs.
- Mean age of menarche in low socioeconomic status was 12.3 yrs.
- High BMI was correlated with early menarche and low BMI was correlated with late menarche.
- Age of menarche is decreasing than the studies conducting in other parts of India and in other parts of the world.
- Age of menarche shows statistically significant association with socio-economic status.
- There was no co-relation between age of menarche and type of diet.

USE OF STUDY

Fall in age of menarche has made young girls more vulnerable to the potential hazards of sexual abuse, unprotected sexual activity, earlier unintended pregnancy, illegal abortion and sexually transmitted diseases.

Lack of knowledge among adolescent regarding sexual development and behavior, more ever they may not be mentally mature enough to exercise the right decision so they have to be assured that these physical, mental, and emotional changes are a normal process of development. [12]

Our study is useful for the counseling of mothers of overweight girls as it is associated with early menarche .the plan of appropriate diet and exercise will definitely help the overweight girls to have proper weight. The underweight girls can be counseled about the diet with proteins and iron to avoid anemia in them. Our study is also useful for the planning of Reproductive and child health(RCH)programs to give the facilities to girls which have attained menarche in the form of sanitation, health education, sex education and about the social responsibilities.

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