

**A CROSS-SECTIONAL STUDY ON MENARCHEAL AGE AMONG SCHOOL AND COLLEGE GOING GIRLS OF MUNGER DISTRICT (BIHAR) IN INDIA.****Mona Chandani**

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ABSTRACT Menarche is a unique biological marker that signifies the transition of a young girl from childhood to femininity. Age at menarche is not only a parameter that signifies biological characteristics for women but also considered as an indicator to measure the quality of life of a population. This descriptive, cross-sectional study was done over a period of 12-month from January to December 2024 girls of Munger district. A total of 1,100 semi-structured questionnaires were distributed, yielding 973 complete questionnaire and the responses rate was 88.45%. The overall mean menarcheal age for the study population was 12.12 ± 1.437463917 years with 12 years shows the peak value. The girls of urban area reach menarche earlier than rural area due to dietary habit, lifestyle factors etc. which impact earlier puberty.

KEYWORDS : Menarche, Puberty, Welch's t-test, Lifestyle**INTRODUCTION**

There are several turning points in the life of a girl child as she grows to become a female able to reproduce. The last and the most important event of this sexual development is the first episode of menstrual flow referred to as menarche (Birla et al., 2018a). The age at which girl menstruates for the first time has a marked bearing on her reproductive potentiality. Fertility is one of the most important factors among the two factors that affect population, and the second one is mortality. The age at menarche is itself determined by multiple factors, including hormonal and environmental exposures. The most important factor that influences the menarche is being food and atmospheric temperature (Birla et al., 2018b; Birla, 2022). Menarche is the marker that signals the beginning of normal reproductive life span of female and is defined as age at the first menstrual period. The subjects for the present study were chosen school and college going girls (Birla et al., 2018; Birla et al., 2018b; Birla et al., 2019).

A long-term decline in the age at menarche has been observed globally among populations in both developed and developing countries since the beginning of the 20th century (Cabanes et al., 2009). Several studies have investigated this progressive shift in the timing of pubertal onset. Recent research, including findings reported by the Population Association of America, has demonstrated a significant worldwide reduction in the age of menarche, a trend that appears consistent across different socioeconomic backgrounds, racial groups, and ethnicities. Historical evidence indicates that the average age at menarche decreased from more than 16 years in the mid-1800s to below 13 years by the 1980s, highlighting a substantial change in the pattern of female pubertal maturation over time (Onland et al., 2005).

Several studies show that the trend at menarcheal age in England (Okasha et al., 2001). Israel (Chodick et al., 2005). China (Meng et al., 2017). (Huen et al., 1997). India (Pathak et al., 2014). Korea, Ghana (Ameade et al., 2016), Mexico (Marvan et al., 2016). Thailand (Noipayak et al., 2017) and USA (Wyshak et al., 1983, Nichols et al., 2006). In Europe the menarcheal age is 16 to 17 years during mid-19th century but it becomes 13 years in mid-20th century (Peters et al., 1957), and in Chinese adolescent girl the age at menarche before 1976 is 14.25 and it became 12.60 in Chinese girl born after 2000 showing estimated decline of 0.51 years per decade (Meng et al., 2017). A declining trend was observed in several countries such as Canada, Japan, Taiwan, Russia, Turkey and Indonesia (Marvan et al., 2016). In India studies shows that average menarcheal age is 14 years in 1955 (Peters et al., 1957) and Indian Human Development Survey evidences that reduction in menarcheal age nearly one month per decade suggesting declining trend of menarcheal age in Indian girls (Pathak et al., 2014). A similar study was conducted In West Bengal showed the mean menarcheal age is 12.8 years (Sanyal et al., 2008), and there was another study in urban area of south India in 2018 shows mean value (Omidvar et al., 2018). Thus, a declining trend is observed in menarcheal age several studies which cause many health problems.

MATERIALS AND METHODS

A descriptive, cross-sectional study was conducted for 12 months January 2024 to December 2024 among government/private school and college going girls of Munger district in Bihar. Data was collected across both urban and rural institutions which represents hetero-

geneous demographic group. To conduct this study a total of 1100 semi structured questionnaire were distributed and out of these 973 completely filled questionnaire were received and therefore the response rate was 88.45%.

The inclusion criteria were the girls who had already attained menarche can voluntarily participate while exclusion criteria include girls suffering from any congenital disease. Thus, finally the total sample size was 973 successfully participated through multi-stage stratified random sampling.

RESULT

Table 1 Determination of Menarcheal Age Mean in School and College Going Girls of Munger District.

Age at menarche	No. of individuals
9	7
10	91
11	224
12	336
13	196
14	56
15	28
16	28
18	7
Grand Total	973

The large number of participants attained menarche between the age of 11 and 13 years and prominent peak at 12 years.

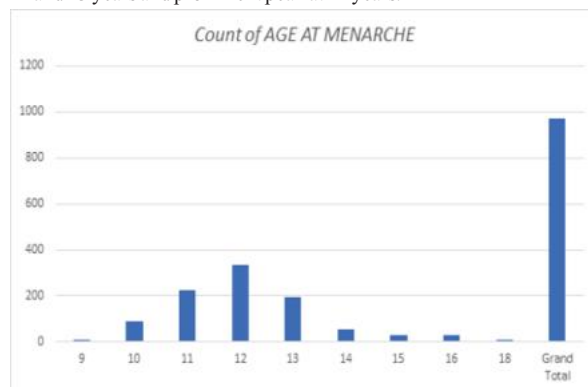


Table 2 Determination of Mean Menarcheal Age (N=973)

Variable	M	SD	SE	MIN	MAX
Age at menarche	12.12230216	1.437463917	0.046082978	9	18

Note: M = mean; SD = standard deviation; SE = standard error of the mean; MIN = minimum; MAX = maximum.

The mean age of menarche is (M = 12.12) years, the standard deviation is (SD = ± 1.437463917), the standard error (SE = ± 0.046082978). The minimum age reported in the study is 9 years and maximum age is 18 years.

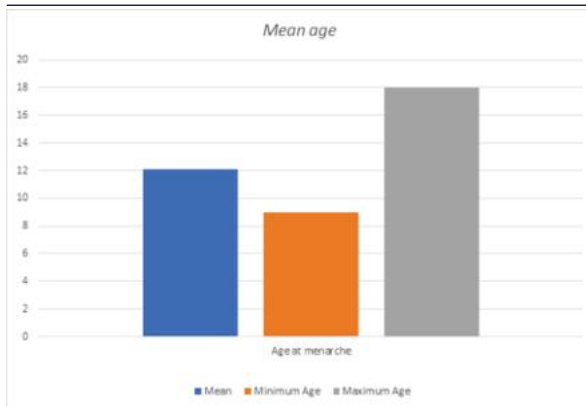


Table 3 Comparison of Mean of Menarcheal Age in Urban and Rural Area of Munger District.

Variable	M	SD	SE
Urban	12.056	1.449435752	0.049027896
Rural	12.71428571	1.166543931	0.117838732

Note: M = mean; SD = standard deviation; SE = standard error of the mean

The mean menarcheal age in Urban area is 12.056 years, standard deviation is ± 1.449435752 and standard error is ± 0.049027896 while in rural area the mean menarcheal age is 12.71428571, standard deviation is ± 1.166543931 and standard error ± 0.117838732 .

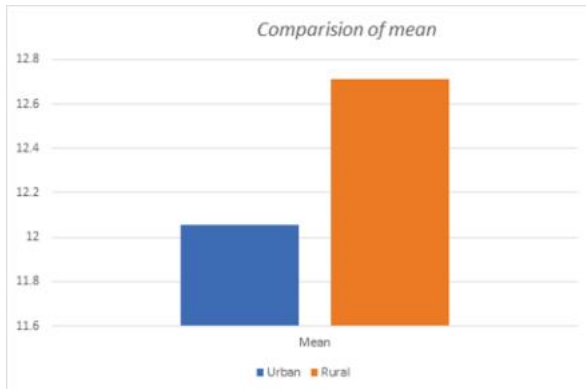
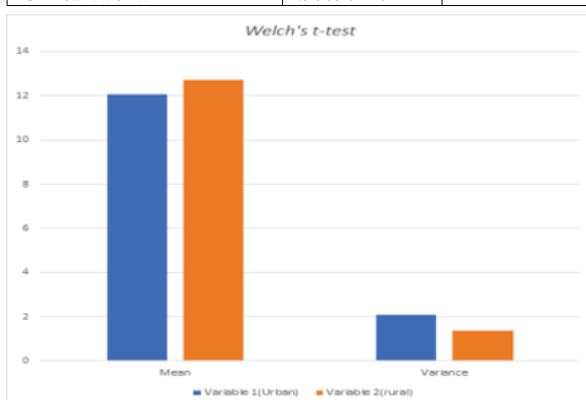


Table 4 Welch's t-test or t-Test Two-Sample Assuming Unequal Variances on menarche.

Column1	Variable 1 (Urban)	Variable 2 (Rural)
Mean	12.056	12.71428571
Variance	2.103267735	1.360824742
Observations	875	98
Hypothesized Mean Difference	0	
df	133	
t Stat	-5.157721285	
P(T<=t) one-tail	4.43067E-07	
t Critical one-tail	1.656391244	
P(T<=t) two-tail	8.86133E-07	
t Critical two-tail	1.977961264	



A Welch's t-test or t-Test Two-Sample Assuming Unequal Variances is conducted to compare between the urban (N=875) and rural (N=98) and this analysis shows a statistically significant difference between the two groups $t(133) = -5.16, p < .001$. The mean menarcheal age for the rural population is ($M = 12.71428571$) and standard deviation ($SD = \pm 1.166543931$) as compared to urban population ($M = 12.056$) and standard deviation ($SD = \pm 1.449435752$).

DISCUSSION

The main objective of this cross-sectional study was to determine the age at menarche among girls of Munger district in Bihar, and to compare mean menarcheal age in urban and rural area. Our findings reveal that the overall mean menarcheal age is 12.12 ± 1.437463917 years with majority of participants menarcheal age is 12 years. This study also indicates the declining trend in menarcheal age across India (Marvan et al., 2016). Our study also shows statistically significant variation in age at menarche in girls living in urban area and girls living in rural area. Girls residing in urban area reached earlier menarche 0.66 years or approximately 8 months 12.056 years for urban and 12.71428571 years for rural.

The earlier onset of menarche in girls of urban area may be due sedentary life style, consumption of junk food while in girls of rural areas suffering from nutrition deficiencies may experience late menarche.

Welch's t-test also confirmed higher degree of internal variance within the urban area ($\sigma^2 = 2.103267735$) as compared to the rural area ($\sigma^2 = 1.360824742$) which confirms variation in age of menarche is visibly wider in the urban area as compared to the rural area.

The age at which girl menstruates for the first time has a marked bearing on her reproductive potentiality. Fertility is one of the most important factors among the two factors that affect population, and the second one is mortality. It has been a common observation that girls undergoing menarche at an early age have a better reproductive capacity than those menstruating at a higher age. The age at menarche is itself determined by several factors, the most important being food and atmospheric temperature (Birla et al., 2018b).

Menarche is the marker that signals the beginning of normal reproductive life span of female and is defined as age at the first menstrual period. The subjects for the present study were chosen school and college going girls. The results are in close proximity with those of other workers (Birla et al., 2018a; Birla et al., 2018b; Birla et al., 2019).

Multiple factors, including hormonal and environmental exposures, socioeconomic status are hypothesized to influence the menarche. Menarche age has important health implications, as early menarche is associated with more cardiovascular incidents and higher all cause, including cancer, especially of the breast, mortality. Late menarche is associated with osteoporosis and increased fracture risk. Moreover, early menarche has been related to anxiety symptoms, depression, premature intercourse and violent behaviour (Birla, 2022).

CONCLUSION

This study develops a baseline regarding menarcheal age in girls of Munger district in Bihar, which shows the overall mean menarcheal age 12.12 ± 1.437463917 years with maximum number of participants reach menarche at the age of 12 years. Our study also confirms statistically significant difference in menarcheal age in urban and rural area which is 0.66 years or 8 months which means urban girls attain menarche 8 months earlier than the rural girls which in mainly due to the lifestyle difference in urban and rural area.

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