



## REPRODUCTIVE FITNESS - A CASE STUDY OF AGE AT MENARCHE AND MENOPAUSE.

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### ABSTRACT

The authors investigated secular trends in age at menarche & age at menopause within a population-based cohort of Dhaneshwar Saundik women of Munger district in Bihar, India. A woman's age at menarche (first menstrual period) and her age at menopause are the alpha and omega of her reproductive years. A temporal study of age at menarche of Dhaneshwar girls has been conducted. It was found that the average age of females at menarche and at menopause is about 13.49 years and 49.51 years respectively.

**KEYWORDS** : Menarche, Menopause, Reproductive Fitness, Dhaneshwar Saundik, Temporal.

### Introduction

Menarche and menopause are landmarks that signal the beginning and end of normal reproductive life for women respectively.

The interval between menarche and menopause defines a woman's natural reproductive span and has been reported in the article, International variability of ages at menarche and menopause: patterns and main determinants (Thomas et al. 2001). "Menarche" is the event signalling the onset of the female reproductive cycle while "Menopause" is the permanent cessation of ovulation and menses – that is, the final menstrual period confirmed by the subsequent 12 consecutive months without a menstrual period (World Health Organisation report, 1990 & 1996).

There are several milestones in the life of a girl child as she grows to become a female able to reproduce. The last major event of this sexual development is the first episode of menstrual blood flow referred to as menarche (Ersoy et al. 2005). This important developmental milestone in females has been found to vary greatly across countries (Thomas et al 2001).

Age at menarche was defined as age at the first menstrual period and age of menopause was defined as the age at last menstruation. By addressing both age at menarche and age at menopause, our study was able to define a measure of reproductive life span.

The objective of the present study is to know age at menarche, age at menopause, and thus, the duration of the reproductive life span among the women of Dhaneshwar Saundik population of Munger district in Bihar.

### Materials and Methods: Dhaneshwar Saundik population of human population and survey in Munger district of Bihar.

#### Study design and setting

This cross sectional study conducted between July, 2017 and June, 2018 was among female students of Girls' High Schools of Asarganj (Munger) and females of Dhaneshwar Saundik population of Munger district in Bihar. The females belonged to the middle class group of the society. The instrument for this study was a semi-structured questionnaire. Of the 389 questionnaires distributed, 311 (205 completed families + 106 uncompleted families and unmarried girls) were returned and completed well enough to be included in this study. The response rate was therefore 79.95%.

The Dhaneshwar Saundik population of Munger district has been picked up as a case study. The population has been preferred owing to the existence of endogamous groups within it. At the same time the author of this manuscript also belongs to this very population. Thus, it was easier to find the location of the families belonging to this population. The Dhaneshwar Saundik population is an

especially interesting and challenging subject for demographic research as these groups are basically business oriented and have played important role in the social uplift of the district. We did a survey of Dhaneshwar Saundik population of Munger district from different locations. The locations that were visited for raw data were at least 10 families and at most 50 families were consulted from each location. The survey was done for a period of twelve months ranging from July 2017 to June 2018.

All participants were required to complete a standard self-reported questionnaire with 19 questions addressing age, sex, personal and family medical history, age at menarche, age at menopause, parity, smoking and drinking habits, and physical activity. Data on various ingredients of reproductive fitness was collected randomly among Dhaneshwar Saundik population from villages/towns/cities of Munger district in Bihar and was recorded on questionnaire sheet. The subjects surveyed were mostly from elderly women who have completed their reproductive life span. Cross checking of the data with elder persons of the family was done to correct figures in some cases. Major physical (floods, earthquakes, draught, forest fire), social (certain festival) and political (independence of India, visit of VIP) events were used to determine the age of the subjects.

#### Women's reproductive history

Women's reproductive history included age at menarche, parity, age at birth and breastfeeding duration for each live birth, menopause status and age at menopause for post-menopausal women, and history of oral contraceptive (OC) use, hysterectomy, ovarian or breast surgery.

#### Assessment of menarcheal age

There are three methods for assessing age at menarche, a) the status quo, b) the recall or retrospective, and c) the prospective methods (Cameron 2002).

a) In the status quo method data regarding menarcheal age can be obtained by asking a girl (or her parent) of her "current status", i.e. whether she has had her first menses by the time of assessment, and her birth date. In the status quo method the sample must be large, representative of the population, and in the developed countries the age range should be from 8 to 16 years old.

b) In the recall method menarcheal data are obtained by asking post-menarcheal females (or their mothers) to recall their age at first menses. The recall method may be less valid and its accuracy is decreased with greater time elapsed between menarche and asking for the date, because it is fraud with poor memory. Furthermore, all girls included must be at an age that they normally should have already started menstruating.

c) The prospective method is more accurate, however such studies

are not easy to perform as they should be longitudinal having premenarcheal girls followed regularly, ideally every 3 months, and asked at each visit whether they have begun to menstruate.

The menarcheal age of respondents was determined using the recall method. Respondents were requested to state to the nearest whole year, how old they were when they first experienced menstrual flow.

Reproductive health, from menarche to menopause, is not only understood as being integral to women's overall health and wellbeing, but is increasingly recognized as a sentinel of chronic disease in later life (Hardy et al 2005). Therefore, most studies on menarcheal age have employed the status quo or the recall methods.

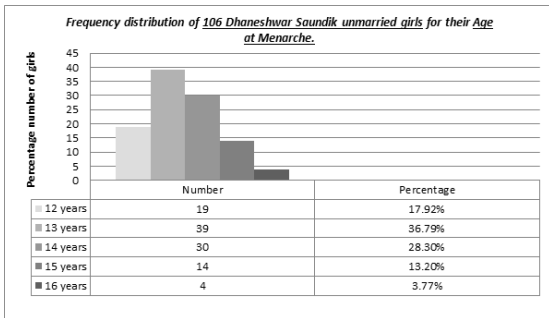
**Result**

**Age at menarche:** The landmarks of the pubertal events in girls are the onset of puberty, peak height velocity (PHV) and menarche. The onset of puberty is marked by the development of breast tissue, while PHV is the highest velocity that is observed during the pubertal growth spurt. Menarche is a rather late event in puberty and usually occurs 6 months after PHV is achieved. The age that menarche occurs varies and is dependent on the interaction between genetic and environmental factors. (Karapanou and Papadimitriou; 2010). The age at which a girl menstruates for the first time has a marked bearing on her reproductive potentiality. It has been a common observation that girls undergoing menarche at an early age have a better reproductive capacity than those menstruating at higher age. The subjects for the present study were chosen from girls' schools, women's hostels and randomly from middle class families in villages/towns/cities of Munger district in Bihar from. The data also include a few other women who could recall the month and year of their first menstruation.

**TABLE - 1.1**

*Frequency distribution of 106 Dhaneshwar Saundik unmarried girls for their Age at Menarche.*

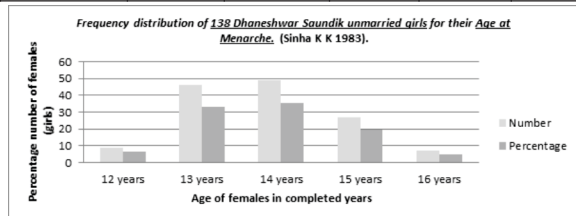
Age in years	12 years	13 years	14 years	15 years	16 years
Number	19	39	30	14	04
Percentage	17.92%	36.79%	28.30%	13.20%	3.77%
Total Numbers - 106		Mean (Average) - 13.48113			
Standard deviation - 1.05317		Standard Error - 0.1022			



**TABLE - 1.2**

*Frequency distribution of 138 Dhaneshwar Saundik unmarried girls for their Age at Menarche. (Sinha KK 1983).*

Age in years	12 years	13 years	14 years	15 years	16 years
Number	09	46	49	27	07
Percentage	6.52	33.33	35.50	19.56	5.07



**TABLE - 2**

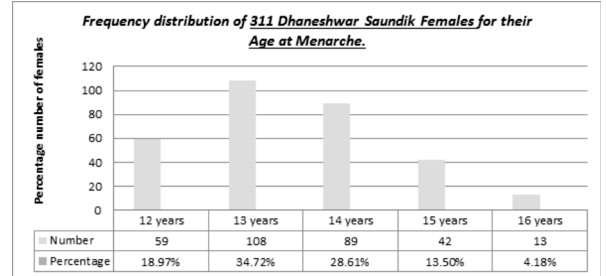
*Frequency distribution of 205 Dhaneshwar Saundik women (Mothers) for their Age at Menarche.*

Age in years	12 years	13 years	14 years	15 years	16 years
Number	40	69	59	28	09
Percentage	19.51%	33.65%	28.78%	13.65%	4.39%
Total Numbers - 205		Mean (Average) - 13.49756			
Standard deviation - 1.08747		Standard Error - 0.0759			

**TABLE - 3**

*Frequency distribution of 311 Dhaneshwar Saundik Females for their Age at Menarche.*

Age in years	12 years	13 years	14 years	15 years	16 years
Number	59	108	89	42	13
Percentage	18.97%	34.72%	28.61%	13.50%	4.18%
Total Numbers - 311		Mean (Average) - 13.49196			
Standard deviation - 1.07423		Standard Error - 0.0609			



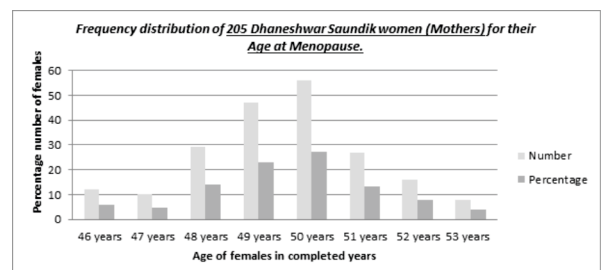
The results (Table - 3) are in close proximity with those of other workers (Sinha KK and Sinha SP, 1980 on four caste groups of Bihar: range 13.50 to 13.75 yrs).

**Age at menopause:** The period in a woman's life (typically between the ages of 45 and 55) when menstruation ceases. Menopause marks the end of the reproductive phase of a woman's life and usually occurs between the ages of 40 and 60 years (Bromberger et al. 1997), and in Western industrialized countries is between 48 and 52 years (Hardy et al. 2000). Menopause, also known as the climacteric, is the time in most women's lives when menstrual periods stop permanently, and they are no longer able to bear children. Menopause is the permanent cessation of ovulation and menses - that is, the final menstrual period confirmed by the subsequent 12 consecutive months without a menstrual period (World Health Organisation report, 1990 & 1996). Age of menopause was defined as the age at last menstruation. It is the end of fertility.

**TABLE - 4**

*Frequency distribution of 205 Dhaneshwar Saundik women (Mothers) for their Age at Menopause.*

Age in years	46 years	47 years	48 years	49 years	50 years	51 years	52 years	53 years
Number	12	10	29	47	56	27	16	08
Percentage	5.85	4.87	14.14	22.92	27.31	13.17	7.80	3.90
Total Numbers - 205		Mean (Average) - 49.5122						
Standard deviation - 1.65568		Standard Error - 0.1156						



## Discussion

Strengths of this study include: the prospective design, the large population-based sample size, and the high response rates. In addition, the current study was restricted to women who had natural menopause. The main limitation of this study is that ages at menarche and menopause were self-reported and may, therefore, be subject to recall bias. However, previous studies have reported that the recall of age at menarche and menopause is relatively accurate. Furthermore, due to the differences in dietary and environmental exposures, the findings of our study may not be directly generalizable to other populations (Belsky et al; 2010).

### Relationship between age at menarche & age at menopause —

There is conflicting evidence concerning the relationship between ages at menarche and menopause. Some studies have found a relationship between earlier menarche and earlier natural menopause or perimenopause (Parazzini F; 2007). Ages at menarche and menopause have been shown to be associated with adverse health outcomes in later life. For example, earlier menarche and later menopause have been independently linked to higher risk of breast cancer. Earlier menarche may also be associated with an increased risk of endometrial cancer, menstrual problems and adult obesity (Mishra et al. 2009).

Stated in terms of antagonistic pleiotropy, the ongoing hypoestrogenic endocrine environment, beneficial during lactation, results in acceleration of several age-related health conditions following menopause (i.e. late postmenopausal osteoporosis, cardiovascular disease and cognitive decline). In contrast, the complex hypoestrogenic hormonal milieu present during postpartum lactation provides biologic advantages to both mother and newborn. The lactational hormonal milieu causes symptoms similar to those of the late perimenopause and early postmenopause, prompting theories for their biologic selective advantage (Pollycove et al 2011).

Menarche and menopause mark the onset and cessation, respectively; of ovarian activity associated with reproduction, and affect breast cancer risk (Collaborative Group on Hormonal Factors in Breast Cancer, Secretariat, Cancer Epidemiology Unit, Richard Doll Building, Oxford OX3 7LF, UK).

## Conclusion

The reproductive fitness of the population has been studied in terms of age at menarche and age at menopause. The mean age of menarche of the respondents in this study was 13.49 years when most of them were in junior high schools and the mean age of menopause of female respondents of Dhaneshwar Saundik population of Munger district in Bihar, India was 49.51 years. Age at menarche was influenced by socio-economic status of girl child. We observed a decreasing average age at menarche (13.83 years; Sinha KK, 1983 – 13.49 years, now) by 0.34 years, increasing mean age at menopause and subsequent increase in the average reproductive life span. The improvement of socioeconomic conditions that took place in the 21st century resulted in an earlier onset of puberty in children, indicated by fall of the age at menarche. More studies are needed in order to predict which girls (females) may develop metabolic or psychological disturbances due early or late reproductive cycle (menarche and menopause) and whether they can be benefited by medical manipulation of the pubertal events.

## Acknowledgments

I would like to thank all the people who have helped in pursuing my research. First of all I would like to thank Dr. Kamal Kishor Sinha for giving me an opportunity to work under his guidance. His guidance, moral support and work ethics have inspired me to complete this work successfully. I would like thank Dr. S.K. Tata for giving me new ideas, teaching me and for being an epitome of hard work. I also thank him for correcting my initial manuscripts, writing first draft of the report and had final responsibility for the decision to submit. I would like to thank the participants, study staff and Mrs. Poonam

Devi, Principal of Bhabha Mission Academy, school of sciences, Munger, who assisted in the piloting and retrieval of questionnaires. I would also like to thank Principals of Girls High Schools of Munger district for their advice, help and support on this project, as well as study staff and students. I, Saurabh Birla (the lead author) affirm that I have listed persons who contributed significantly in this study to be named author or acknowledged for their contribution. I am thankful to my family, brother and sister whose constant moral support and best wishes were always helping me during this research period. I would like to thank from the core of my heart to my parents, especially my mother to whom I dedicated this research and who has continuously helped and inspired me in collecting data and information regarding my project. My heartfelt thanks go to my friends Miss Runjhun Mishra, Mr Sujeet and others for extending their valuable cooperation in completing the work within a short span of time. I would once again like to thank all those who have directly or indirectly helped me during my research work.

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