

## Age at Menopause and its Determinants.

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### ABSTRACT

**Background:** Menopause marks the transition of a women's reproductive life. The age at menopause shows variability from region to region and have been found to be affected by various biosocial factors like body size and shape, age at menarche, socioeconomic status, parity, income, educational status and dietary habits. The study aims in identifying the determinants of menopause. **Methods:** The study was done on 100 menopausal women, 1 to 5 years since cessation of menstruation. Various variables like age at menarche, settlement, religion, occupation, socioeconomic status, history of joint pains, parity, BMI, blood pressure (systolic and diastolic) and haemoglobin content were taken. Data was analysed using SPSS version 22, to find any association of these variables with age at menopause. **Results:** The present study revealed a mean age of 45.5 ( $\pm$  2.3) years with a median age of 46 years at natural menopause. Women who attained early menarche has early onset of menopause and vice versa. The study revealed a significant relationship between mean age at menopause with variables like settlement (rural women having earlier onset compared to urban women, p value of 0.001), socioeconomic status (low class having an earlier onset followed by middle class and high class with a p-value of 0.003), menstrual cycle (women with regular menstrual cycle has an earlier age at menopause as compared to women with irregular menstruation) and parity (women with high parity  $>2$  has earlier onset of menopause as compared to those having parity of  $\leq 2$ ). **Conclusion:** Age at menopause is important as the timing of menopause is an indicator of ovarian function and aging and critical for a women's health.

**Keywords:** Age at menopause, determinants, biosocial variables, menarche.

### INTRODUCTION

Menopause is defined as the permanent cessation of menses for 1 year and is physically correlated with the decline in estrogen secretion resulting from the loss of follicular function.<sup>[1]</sup> The age at which natural menopause occurs is between 45 to 55 years for women worldwide.<sup>[2]</sup> The mean age at natural menopause is 51 years in industrialized nation, while it is 48 years in poor and non-industrialised nation like India.<sup>[3]</sup> Secular changes in average age at natural menopause are not well documented but there is some evidence to suggest that there has been a modest increase in the average age at menopause over the course of the 20th century. The impact of menopause is felt in physical, psychological and sociocultural domain and continues into post menopausal years.<sup>[4]</sup>

A number of menopausal women are projected to rapidly increase from a total of 467 million to 1200 million by 2030 all around the world and the rate of increase is substantially faster in developing world than in industrialized world and a total of 130 million Indian women are expected to live beyond menopause into old age by 2015.<sup>[3]</sup> Menarche and menopause are two major components in the reproductive life of women since the interval between the two events determine the natural reproductive period during which a women can procreate. Because these biological traits have important cultural, social and epidemiological implications, increasing attention have recently been given to understand the cause of age variation in the timing of these events.

Although results are not consistent from one study to another, several factors have been shown to significantly influence age of menopause. There are various bio-social factors / variables which are believed to be associated with the age of onset of menopause and they include body size and shape, age at menarche, socio-economic status, age at first child birth, parity, income, educational status and dietary habits.

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The most important determinants of age at natural menopause are considered to be factors that affect the duration of decline in ovarian follicle reserve and it includes:

- a. Number of primordial germ cells that migrate to the gonadal ridge during intrauterine life.
- b. Mitotic abilities of these cells until gestational age of approximately 16-20 weeks.
- c. Rate of follicular atresia in both intra and extrauterine environment suggesting that early life factors may play an important role in influencing age at menopause.<sup>[5]</sup>

The first two factors are genetically set but the modifiable factors depends on those factors which will accelerate or reduce the follicular atresia and these includes a number of intrinsic and extrinsic factors like smoking, parity, age at menarche, socioeconomic status, occupation etc.<sup>[6]</sup>

The present study was undertaken to determine the mean age at menopause and to see whether there is any a significant relation of age at menopause with age at menarche, Settlement (Urban / Rural), Religion, Occupation, Socioeconomic status, Menstrual cycle, Parity, BMI, Systolic BP (mm Hg), Diastolic BP(mm Hg)and Haemoglobin level (gm%).

## MATERIALS AND METHODS

The study was conducted on menopausal women attending Obstetrics and Gynaecology OPD in Jawaharlal Nehru Institute of Medical Sciences, Porompat, and Manipur during the period January 2016 to July 2016. A total of 100 women who have attained natural menopause 1 to 5 year since the

cessation of menstruation are taken into the study. The proforma of the entire subjects were maintained wherein a detailed history of clinical information including particulars of the subject, detailed gynaecological and obstetrical history, socioeconomic status, literacy status and personal habits were taken.

In order to achieve the objectives of the study, the following parameters have been taken into account like age at menarche (years), parity ( $\leq 2$  and  $>2$ ), occupation (manual labourer, housewife and government employee), socioeconomic status (high, middle or low in accordance with modified Kuppuswamys classification). The BMI was calculated by using the formula  $BMI = \text{weight in Kg} / \text{height in m}^2$  and a reference of 23 was taken according to the South east Asian level whereby  $\geq 23$  was taken as obese.<sup>[7]</sup> Blood pressure both systolic and diastolic (mm Hg) was measured by using mercury sphygmomanometer. Haemoglobin was measured by Shahli's method. The median age of menopause were taken as 48 years and women were classified into two groups ( $<48$  years and  $\geq 48$  years) and statistical analysis was done.

The data was processed through SPSS version 22 where descriptive statistics like mean, standard deviation, median etc were applied and analytical statistics including t-test and chi square test were applied wherever applicable.

## RESULTS

Analysis of the present study revealed a mean age of 45.5 ( $\pm 2.3$ ) years with a median age of 46 years at natural menopause.

**Table 1: Comparison of age at menarche (years) and menopausal age (years)**

Menopausal group	Age at menarche mean (SD)	t- value	P-value
< 48 years	12.25 (1.501)	- 6.379	0.0001
$\geq 48$ years	14.21 (1.317)		

Table 1 shows that women who attained menarche at an age  $< 13$  years has early onset of menopause (age  $< 48$  years) while women who attained menarche at

a later age ( $\geq 13$  years) attained menopause at a later age ( $\geq 48$  years) and this finding was found to be statistically significant with a p-value of 0.0001.

**Table 2: Comparison of menopausal age with selected variables**

Variable	Menopausal age		P-value
	< 48 years (N%)	$\geq 48$ years (N%)	
Settlement	Urban	28(51.9)	0.001
	Rural	39(84.8)	
Religion	Christian	16(80.0)	0.166
	Hindu	40(60.6)	
	Muslim	11(78.6)	
Occupation	Govt.Employee	25(56.8)	0.082
	House wife	16(66.7)	
	Man Labourer	26(81.3)	
Socio economic Status	High	7(43.8)	0.003
	Low	30(88.2)	
	Middle	30(60.0)	
	No	38(76.0)	

H/O of joint pain	Yes	29(58.0)	21(42.0)	0.056
Menstrual cycle	Irregular	14(43.8)	18(56.3)	0.001
	Regular	53(77.9)	15(22.1)	
Parity	≤ 2	16(53.3)	14(46.7)	0.049
	>2	51(72.9)	19(27.1)	
BMI	<23	13(59.1)	9(40.9)	0.372
	≥23	54(69.2)	24(30.8)	
SBP(mm Hg)	≤120	46(63.9)	26(36.1)	0.289
	>120	21(75.0)	7(25.0)	
DBP(mm Hg)	≤80	57(67.1)	28(32.9)	0.976
	>80	10(66.7)	5(33.3)	
Hb (gm%)	<12	29(63.0)	17(37.0)	0.437
	≥12	38(70.4)	16(29.6)	

In Table 2 the menopausal age were divided in two groups (<48years and ≥ 48 years) and analysis was done by using chi Square test against the variables. It was observed that a significant relationship exist between the mean age at menopause with variables like settlement (rural women having earlier onset of menopause as compared to urban women with a p-value of 0.001), socioeconomic status (low class having an earlier onset followed by middle class and high class with a p-value of 0.003), menstrual cycle( women with regular menstrual cycle has an earlier age at menopause as compared to women with irregular menstruation) and parity (women with high parity >2 has earlier onset of menopause as compared to those having parity of ≤2). The other variable like religion, occupation, joint pain, BMI, blood pressure (systolic and diastolic) and haemoglobin concentration were found to be statistically insignificant.

## DISCUSSION

In the present study the mean age of 45.5 years at which natural menopause is almost comparable to those reported for rural women in north India (44.10 years)<sup>[8]</sup>, Baroda females (44.59 years)<sup>[9]</sup> and Bazzigar women of Punjab (46.98 years)<sup>[10]</sup>. While comparing certain international studies, it was found that average age of menopause in American women (50.9 years)<sup>[11]</sup>, Australian women (50.2 years)<sup>[12]</sup> and Finland (51 years)<sup>[13]</sup> are higher .

Evidence of continuity in reproductive health across the life course of a women indicates that for some, the burden of poor reproductive health may be lifelong. Women attaining early menarche are more likely to have menstrual problems which in turn may lead to gynaecological problems and subfertility and which are linked to earlier menopause.<sup>[5]</sup>

Vigorous activity has been shown to restrict ovarian function by decreasing serum estrogen and increasing sex hormone binding globulin, which could lead to earlier menopause.<sup>[14]</sup>

The findings of our study is consistent with other studies like Luoto R et al, Parazzini F et al and Zsakai A et al.<sup>[14-16]</sup> For most of the factors claimed to influence the timing of menopause, the evidence is poor. Parity has been linked with menopausal age

whereby nulliparous women has an early menopause while increased parity correlates with later menopause. The question remains as to what determines the age of menopause? The most important factor is the number of ovarian follicles.<sup>[17]</sup> Depletion of the ovarian follicles occurs independently of physiological and environmental factors (with the exception of those that actually destroys the follicles) until the perimenopausal age is reached. The rate of loss of primordial follicles then accelerates and menopause occurs when the number of follicles has fallen below a critical number. The accelerated loss of primordial follicles in the perimenopausal phase occurs in parallel with rising gonadotrophin concentration. It is not known whether the rate of depletion of ovarian follicular reserve is regulated primarily by factors within the ovary itself or from a primary change in the control of the gonadotrophins nor is the trigger mechanism known.

Many studies have revealed that factors such as parity, nutrition, race, smoking etc. influence the age at natural menopause at most 3 years on either side of the median. It has been found that lifestyle factors and general health status can influence the reproductive ageing by damaging the oocytes and decreasing the level of sexual hormones. High socioeconomic status, low parity, urban settlement and irregular menstrual cycle all correlates with the lifestyle and general health of the women and hence may have a role in determining the age of menopause.

## CONCLUSION

Timing of menopause is an indicator of ovarian function and ageing and therefore critical for women's health. Both early and late age at natural menopause have been shown to be associated with adverse health outcomes in postmenopausal women highlighting the importance of identifying the factors associated with the onset of menopause.

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