

**Original article:**

## **Age of onset of menopause and the factors affecting it in the women of Uttar Pradesh**

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### **ABSTRACT:**

**OBJECTIVE-** Cross-sectional study of 1 year conducted on 500 postmenopausal women attending Out-patient department of obstetrics and gynaecology at Rohilkhand Medical College & hospital, Bareilly, Uttar Pradesh. The study intends to determine the age of onset of menopause and the factors affecting it in the women of Uttar Pradesh.

**MATERIAL AND METHODS -** We took data from 500 postmenopausal women attending Out-patient department of obstetrics and gynaecology at Rohilkhand Medical College & hospital, Bareilly, Uttar Pradesh, over one year period, after taking informed consent from the patient. Detailed history was tabulated with special emphasis on menopausal status, clinical examination including breast examination, haemoglobin, Urine R/M, FBS, PPBS and Papanicolaou smear were done.

**RESULTS -** Out of 500 women in our study 69 (13.8%) were hypertensive while 431(86.2%) had no history of hypertension. The mean age at menopause for women with high blood pressure was  $45.68 \pm 5.78$  years while the mean age at menopause for women with normal blood pressure was  $47.25 \pm 5.31$  years.

**CONCLUSION-** The mean age at menopause in the women of Uttar Pradesh is  $47.04 \pm 5.40$  years. Urban females, earlier age at menarche, multiparity, higher income, obesity, sedentary lifestyle, and higher socioeconomic status, had later onset of menopause. While smokers, diabetic and hypertensive women had earlier menopause.

### **INTRODUCTION**

The word menopause comes from the Greek words *men* (month) and *pausis* (cessation). It refers to that time in a woman's life when there is a pause in the menses, a cessation of future reproductive function. According to the World Health Organization(WHO) meeting in Geneva in 1980, the scientific group defined natural menopause as no menses for 12 consecutive months with no obvious intervening cause, such as pregnancy, lactation, exogenous hormone use, dietary deficiencies, or surgical removal of the uterus or ovaries (WHO 1982).<sup>[1]</sup>

Menopause is described as an outcome event of loss of ovarian follicular activity that is characterized biologically by decline in fertility, endocrinologically by alteration of both gonadotrophin and steroid hormone levels, and clinically by variation in menstrual cycle length and experience of a variety of symptoms.

The older words *perimenopause* and *climacteric* refer to the late reproductive years, usually late 40s to early 50s. These can be used with patients but less so in scientific settings. Here, the term *menopausal transition (MT)* is preferred (Soules MR et al., 2001).<sup>[2]</sup> Characteristically, MT begins with menstrual cycle irregularity and extends to 1 year after permanent cessation of menses. This reproductive aging with loss of follicular activity progresses within

a wide age range (42 to 58 years). The average age at its onset is 47, and MT typically spans 4 to 7 years (McKinlay et al., 1992).<sup>[3]</sup>

The age at which natural menopause occurs is between 45 to 55 years for women worldwide.<sup>[4]</sup> Mean age at menopause in Indian women ranges from 40.32 to 48.84 years<sup>[5]</sup> and it varies from area to area. There are some factors, genetic and others which affect the age of onset of menopause.

The mean age at natural menopause (ANM) is 51 years in industrialized nations, while it is 48 years in non-industrialized nations.<sup>[6]</sup> Menopause is an important event in the life of women and with the increase life expectancy at birth for women they spend about more than one-third of their lives in this phase. The age at natural menopause remains an independent risk factor for long-term morbidity and mortality.

A woman in the United States today will live approximately 30 years, or greater than a third of her life, beyond the menopause. The age at menopause appears to be genetically determined and is unaffected by race, socioeconomic status, age at menarche, or number of prior ovulations. Factors that are toxic to the ovary often result in an earlier age of menopause; women who smoke or exposed to chemotherapy or pelvic radiation experience an earlier menopause. Women who had surgery on their ovaries or had a hysterectomy, despite retention of their ovaries, may experience early menopause. Premature ovarian insufficiency, defined as menopause before the age of 40 years, occurs in 1% of women. It may be idiopathic or associated with a toxic exposure, chromosomal abnormality, or an autoimmune disorder.

The aim of the current study is to determine the effect of the factors on the onset of age of menopause and to determine the age of menopause in the women of Uttar Pradesh.

#### **MATERIAL AND METHODS:**

We took data from 500 postmenopausal women attending Out-patient department of obstetrics and gynaecology at Rohilkhand Medical College & hospital, Bareilly, Uttar Pradesh, over one year period, after taking informed consent from the patient.

Detailed history was tabulated with special emphasis on menopausal status, clinical examination including breast examination, haemoglobin, Urine R/M, FBS, PPBS and Papanicolaou smear were done.

#### **Inclusion criteria:**

1. Postmenopausal women aged >35 years attending Obstetrics and gynaecology Outpatient department.
2. with no history of post-menopausal bleeding.

#### **Exclusion criteria:**

1. Patients <35 years of age
2. with history of postmenopausal bleeding
3. Surgical menopause
4. with organic pathology of the pelvis revealed on gynaecological examination.

**RESULTS:**

**Table-1 Table showing distribution of cases according to the age at Menopause**

Age at menopause(years)	Number of cases	Percentage (%)
35-40	57	11.4
41-50	331	66.2
51-60	103	20.6
61-70	9	1.8
<b>Total</b>	<b>500</b>	<b>100</b>

Out of 500 cases in our study, 57 (11.4%) women's had age of menopause between 35-40 years and maximum 331 (66.2%) of women's had age of menopause between 41-50 years, 103 (20.6%) between 51-60 years, and 9 (1.8%) between 61-70 years.

The mean age at menopause in the women of Uttar Pradesh is  $47.04 \pm 5.40$  years.

**Table 2. Distribution of age at menopause according to residence.**

Residence	No. of patients	Percentage (%)	Mean age at menopause(in Years)	t-Value	P-value
Rural	351	70.2	$46.19 \pm 5.31$	5.654	0.000
Urban	149	29.8	$49.09 \pm 5.09$		
<b>Total</b>	<b>500</b>	<b>100</b>			

In our study , 351 women i.e. 70.2% were from rural background. Women from the urban area constituted 29.8 %(149) in this study. Urban females had slightly later onset of menopause i.e.  $49.09 \pm 5.09$ years as compared to their rural counterparts i.e.  $46.19 \pm 5.31$ years.

There was highly significant difference in mean age at menopause according to residence ( $p=0.000$ ).

**Table 3. Distribution of age at menopause according to age at menarche.**

Age at menarche	Number of women	Percentage (%)	Mean age at menopause(in years)	F-Value	P-value
11 years	7	1.4	$51.71 \pm 4.49$	10.75	0.000
12 years	20	4.0	$50.35 \pm 5.88$		
13 years	153	30.6	$48.92 \pm 6.37$		
14 years	210	42.0	$46.06 \pm 2.25$		
15 years	90	18.0	$45.50 \pm 4.19$		
16 years	20	4.0	$44.80 \pm 6.68$		
<b>Total</b>	<b>500</b>	<b>100</b>			

Out of 500 women in our study , 7 women (1.4%) had age at menarche of 11 years , 20 (4.0% ) had age at menarche 12 years , 153 (30.6%) has had their menarche at the age of 13 years , 210 i.e. 42.0% had age at menarche of 14 years , 90 (18.0 %) had age at menarche of 15 years and 20 (4.0%) had age at menarche of 16 years.

This table shows that the earlier is the age at menarche, slightly later is the age at onset of menopause.

There was highly significant difference in mean age at menopause according to age at menarche (p=0.000).

**Table 4. Parity specific distribution of age at natural menopause**

Parity	Number	Percentage(%)	Mean age at menopause(in Years)	F-Value	P-value
0	30	6.0	44.76 ± 4.91	6.985	0.001
1-4	91	18.2	45.63 ± 6.66		
5+	379	75.8	47.49 ± 5.0		
<b>total</b>	<b>500</b>	<b>100</b>			

Out of 500 women , 30 (6.0%) were nullipara , 91 (18.2%) were para 1-4 while 379 (75.8%) were para 5 +. Our study showed that the age of onset of menopause was late for para 5+ and for para 1- 4 while earlier in nullipara.

There was highly significant difference in mean age at menopause according to parity(p=0.001).

**Table 5 .Distribution of age at menopause according to family income.**

Family's income /month (in Rs)	Number	Percentage(%)	Mean age at menopause(in Years)	t-Value	P-value
<10000	318	63.6	46.58 ± 5.10	2.484	0.0133
>10000	182	36.4	47.82 ± 5.81		
<b>Total</b>	<b>500</b>	<b>100</b>			

Out of 500 women in our study, 318(63.6%) family monthly income < 10000 had age at menopause 46.58 ± 5.10Years and 182(36.4%) family monthly income > 10000 had age at menopause 47.82 ± 5.81Years.

There was significant difference in mean age at menopause according to Family's income /month (in Rs) (p=0.0133).

**Table 6 . Distribution of age at menopause according to occupational status**

OCCUPATION	NUMBER	PERCENTAGE (%)	Mean age at menopause(in Years)	F-Value	P-value
Home maker	318	63.6	47.11 ± 5.75	1.775	0.170
Currently working	65	13.0	47.89 ± 5.32		
Used to work	117	23.4	46.35 ± 4.32		
Total	500	100			

Out of 500 women in our study , 318 (63.6%) are home makers , 65 (13.0 %) are currently working while 117 (23.4%) used to work.

The study shows that women’s occupational status had no effect on age at onset of menopause (p=0.170).

**Table 7. Distribution of age at menopause according to socioeconomic status**

SOCIO ECONOMIC STATUS	STUDY GROUP	Percentage(%)	Mean age at menopause(in Years)	F-Value	P-value
Class 1	11	2.2	44.0 ± 3.31	8.729	0.000
Class 2	25	5.0	46.2 ± 5.54		
Class 3	437	87.4	46.8 ± 5.28		
Class 4	14	2.8	51.9 ± 6.34		
Class 5	13	2.6	53.2 ± 2.26		
TOTAL	500	100			

In our study , 11 women (2.2 %) had class 1 SES , 25 women (5.0 %) had class 2 SES , 437 women (87.4%) had class 3 SES , 14 women (2.8 %) had class 4 SES while 13 women (2.6%) had class 5 SES.

The table also depicts that age at menopause is later for women with higher socioeconomic status while earlier for women with lower socioeconomic status.

There was highly significant difference in mean age at menopause according to socio economic status (p=0.000).

**Table 8. Distribution of age at menopause according to physical activity**

Exercise pattern	Number	Percentage(%)	Mean age at menopause(in Years)	t-Value	P-value
Exercise	171	34.2	45.12 ± 3.90	5.910	0.000
Sedentary	329	65.8	48.03 ± 5.79		
Total	500	100			

Out of 500 women 171 (34.2 %) had regular physical activity and were found to have earlier menopause (45.12 ± 3.90 years) , while sedentary women 329 (65.8%) were found to have later age at menopause (48.03 ± 5.79) . There was highly significant difference in mean age at menopause according to physical activity (p=0.000).

**Table 9. Distribution of age at menopause according to smoking status**

Smoking status	No . of women	Percentage(%)	Mean age at menopause(in Years)	t-Value	P-value
Smoker	117	23.4	45.98 ± 5.83	2.43	0.015
Never smoker	383	76.6	47.36 ± 5.23		
Total	500	100			

**Table 10. Distribution of age at menopause according to BMI**

BMI	Number of women	Percentage(%)	Mean age at menopause(in Years)	F-value	P-value
Normal : 18-22.9	14	2.8	45.57 ± 4.21	25.40	0.0001
Overweight : 23-24.9	236	47.2	45.73 ± 4.54		
Obesity Class1 : 25-29.9	199	39.8	47.11 ± 5.44		
Obesity Class 2 : 30-34.9	40	8.0	52.47 ± 4.80		
Obesity Class 3 : >35	11	2.2	55.90 ± 4.86		
Total	500	100.0			

According to our study , out of 500 women , 14 (2.8%) had normal BMI ,236(47.2%) were overweight , 199 (39.8%) had class 1 obesity ,40 (8.0%) had class 2 obesity and 11 (2.2%) had class 3 obesity .

The table shows that age at menopause was found to be later for obese women while earlier for underweight women. There was highly significant difference in mean age at menopause according to BMI (p=0.0001).

**Table 11. Distribution of age at menopause according to diabetic status**

Blood Sugar status	No . of women	Percentage(%)	Mean age at menopause(in Years)	t-Value	P-value
Diabetic	129	25.8	45.56 ± 5.96	3.649	0.0003
Non – Diabetic	371	74.2	47.55 ± 5.10		
Total	500	100			

Out of 500 people in our study , 129 (25.8%) were diabetic while 371 (74.2%) were non- diabetic .

Mean age at menopause for diabetic women was 45.56 ± 5.96 years while for non- diabetic women was 47.55 ± 5.10 years. The study shows that the mean age of menopause was slightly earlier for diabetic women as compared to non - diabetic women. There was highly significant difference in mean age at menopause according to diabetic status (p=0.0003).

**Table 12. Distribution of age at menopause according to the blood pressure**

Hypertension	No . of women	Percentage(%)	Mean age at menopause(in Years)	t-Value	P-value
Yes	69	13.8	45.68 ± 5.78	2.252	0.0248
No	431	86.2	47.25 ± 5.31		
Total	500	100			

Out of 500 women in our study 69 (13.8%) were hypertensive while 431(86.2%) had no history of hypertension. The mean age at menopause for women with high blood pressure was 45.68 ± 5.78 years while the mean age at menopause for women with normal blood pressure was 47.25 ± 5.31 years. The table shows that the hypertensive status has significant effect on the age at menopause (p=0.0248).

## DISCUSSION

In the present study, 500 postmenopausal women aged more than 35 years with no history of postmenopausal bleeding were taken for study. The study was conducted in the Department of Obstetrics and Gynaecology, Rohilkhand Medical College and Hospital, Bareilly, U.P. Out of 500 cases in our study,11.4%women had age of menopause between 35-40 years and maximum 66.2% of women’s had age of menopause between 41-50 years, 20.6% between 51-60 years, and 1.8% between 61-70 years.

The mean age at menopause in the women of Uttar Pradesh was found to be 47.04 ± 5.40 years , which was almost comparable to the mean age in study conducted by the Indian menopause society, a PAN India study covering

South, East, West and North and the average age of Indian menopausal women was found to be 46.2 years much less than their Western counter parts (51 years).

Our study was also comparable to the study conducted in other states by Sarika KS et al ( $48.3 \pm 4.15$  years) in Kerala , Bansal P et al ( $45.9 \pm 3.5$  years ) in Punjab and Baghla N (44.6 years ) in Himachal Pradesh respectively.

In our study , 70.2% were from rural background. Women from the urban area constituted 149 in this study. Urban females had slightly later onset of menopause i.e.  $49.09 \pm 5.09$  years as compared to their rural counterparts i.e.  $46.19 \pm 5.31$  years which is comparable to the study conducted by Kaur M et al in Punjabi Brahmin females and concluded that the mean age at menopause was  $48.22 \pm 2.47$  years in rural Brahmin females and  $49.30 \pm 2.80$  years in urban. Urban females report later mean age at menopause as compared to their rural counterparts. This may be attributed to nutritional differences, less infection, better medical care, and better awareness due to education available to urban females besides reproductive, socio-demographic and certain behavioral influences.

Out of 500 women in our study , 1.4% had age at menarche of 11 years , 4.0% had age at menarche 12 years , 30.6% had their menarche at the age of 13 years , 42.0% had age at menarche of 14 years , 18.0 % had age at menarche of 15 years and 4.0% had age at menarche of 16 years.

Those who had age at menarche 11 years had mean age at menopause  $51.71 \pm 4.49$  years , 12 years had  $50.35 \pm 5.88$  years , 13 years had  $48.92 \pm 6.37$ , 14 years had  $46.06 \pm 2.25$  , 15 years had  $45.50 \pm 4.19$  and 16 years had  $44.80 \pm 6.68$  years .

Thus showing that the earlier is the age at menarche, slightly later is the age at onset of menopause which was comparable to the study conducted by Al-Sejari M M (2005)<sup>[16]</sup> . Out of 500 women , 30 (6.0%) were nullipara , 91 (18.2%) were para 1-4 while 379 (75.8%) were para 5+. Our study showed that the age of onset of menopause was late for para 5+ ( $47.49 \pm 5.0$ ) and for para 1- 4 ( $45.63 \pm 6.66$ ) while earlier in nullipara ( $44.76 \pm 4.91$ ) . This result is consistent with the study done by Al-Sejari M M (2005)<sup>[16]</sup> women with parity <5 had mean age at menopause earlier (47.64 years) than multiparous women with parity 5+ (48.13 years ) . Also the study done by Gold et al. (2001)<sup>[14]</sup> which concluded that for parous women, age at natural menopause occurred significantly later than for nulliparous women, showed similar result.

Since onset of menopause is related to the rate of loss of oocytes and thus to the occurrence of ovulatory cycles , the proposed mechanism by which parity and use of oral contraceptives may result in later age at natural menopause is by reducing ovulatory cycles earlier in life and thus preserving oocytes longer, resulting in later menopause.

Out of 500 women in our study , 48% were illiterate and had age at menopause  $44.87 \pm 4.16$  Years , 28% had primary education with age at menopause  $47.65 \pm 4.29$  Years, 13.6% had middle school education with age at menopause  $49.97 \pm 6.75$  Years while 10.4% had higher education more than high school with age at menopause  $51.51 \pm 6.26$  years.

This shows that literacy rate has a positive association with the age at menopause which was comparable to the study conducted by Gold et al. (2001)<sup>[14]</sup> with age at menopause lower (51.0 years ) for education less than high school and college graduates (51.5 years) while later with professional school education (51.7 years ) .

Our study is also in accordance with that conducted by Bromberger et al. (1997)<sup>[21]</sup> with age at menopause earlier (51.1 years) for education less than high school than those with higher education (51.7 years). Thus showing that lower educational status was associated with earlier age at menopause.

Out of 500 women in our study, 63.6% women with family monthly income < 10000 had age at menopause  $46.58 \pm 5.10$  Years and 36.4% with family monthly income > 10000 had age at menopause  $47.82 \pm 5.81$  Years.

Out of 500 women in our study, 63.6% are home makers, 13.0% are currently working while 23.4% used to work. Women who were home makers had mean age at menopause  $47.11 \pm 5.75$  years, those who were currently working had  $47.89 \pm 5.32$  years and those who used to work had age at menopause  $46.35 \pm 4.32$  years.

The study shows that women's occupational status had no effect on age at onset of menopause ( $p=0.170$ ). This was comparable to the study conducted by Delavar MA and Hajiahmadi M (2011)<sup>[23]</sup> according to which women who were house wife had age at menopause  $47.7 \pm 4.9$  years while working women had  $47.9 \pm 4.8$  years with P-value of 0.794.

In our study, 2.2% women had class 1 SES, 5.0% had class 2 SES, 87.4% had class 3 SES, 2.8% had class 4 SES while 2.6% had class 5 SES according to modified Kuppuswami's scale. Women with class 1, 2, 3, 4 and 5 SES had mean age at menopause  $44.0 \pm 3.31$ ,  $46.2 \pm 5.54$ ,  $46.8 \pm 5.28$ ,  $51.9 \pm 6.34$  and  $53.2 \pm 2.26$  years, respectively. It depicts that age at menopause is later for women with higher socioeconomic status while earlier for women with lower socioeconomic status. This was comparable to the study conducted by Golshiri P et al (2016)<sup>[17]</sup> who observed that lower SES were in 19.7% women with mean age at menopause  $44.97 \pm 2.1$  years, moderate SES in 53.64% women with menopausal age  $48.11 \pm 2.66$  years while higher SES was found in 26.66% women with menopausal age  $52.51 \pm 3.79$  years with P-value < 0.0001. Similar finding was seen in the study by Gold et al. (2001)<sup>[14]</sup>.

Social and physical stress are also associated with amenorrhea and reproductive dysfunction low socioeconomic status may be markers for elevated stress. Out of 500 women, 34.2% had regular physical activity and were found to have earlier menopause ( $45.12 \pm 3.90$  years), while sedentary women 65.8% were found to have later age at menopause ( $48.03 \pm 5.79$ ). This finding was comparable to the study conducted by Al-Sejari M M (2005)<sup>[16]</sup>.

Out of 500 women in our study, the number of women who smoked ever in their life were 23.4% while those who had never smoked were 76.6%. The mean age at menopause for smokers was  $45.98 \pm 5.83$  years while for non-smokers was  $47.36 \pm 5.23$  years. This shows that the mean age at menopause was earlier for women who smoked while later for women who never smoked in their lives. which was comparable to the study conducted by Ossewaarde M E et al<sup>[12]</sup> with mean age at menopause  $49.3 \pm 4.5$  years for non-smokers while  $48.5 \pm 4.6$  years for smokers, Bromberger et al.<sup>[21]</sup> with age at menopause 50.6 years for smokers and 52.0 years for non-smokers, Delavar MA et al.<sup>[23]</sup> with age at menopause 47.1 years for smokers and 47.7 years for non-smokers and Parazzini<sup>[22]</sup> with mean age at menopause 51.0 years for smokers while 51.2 years for non-smokers.

This is justified by the fact that polycyclic aromatic hydrocarbons in cigarette smoke are toxic to ovarian follicles leading to their atrophy which could further result in the loss of ovarian follicles and thus in earlier menopause in smokers.

According to our study , out of 500 women , 2.8% had normal BMI ,47.2% were overweight , 39.8% had class 1 obesity , 8.0% had class 2 obesity and 2.2% had class 3 obesity .Women with normal BMI between 18-22.9 had mean age at menopause  $45.57 \pm 4.21$  years , overweight (23-24.9) had  $45.73 \pm 4.54$  , obesity Class1( 25-29.9 ) had  $47.11 \pm 5.44$  , obesity Class 2 ( 30-34.9 ) had  $52.47 \pm 4.80$  and Obesity Class 3 ( >35) had age at menopause  $55.90 \pm 4.86$  years. This shows that age at menopause was found to be later for obese women while earlier for underweight women which was comparable to the study conducted by Akahoshi M et al (2002)<sup>[24]</sup> according to whom the age at menopause for obese women ( $50.4 \pm 2.8$  y) was significantly higher ( $P < 0.05$ ) than those with lower BMI ( $49.7 \pm 2.8$  y).

Our study was also found to be in accordance with the study conducted by Maru L et al (2016)<sup>[24]</sup> who observed that women with normal BMI between 18-22.9 , overweight (23-24.9), obesity Class1( 25-29.9 ), obesity Class 2 ( 30-34.9 )and Obesity Class 3 ( >35) had mean age at menopause 52, 54,54,55 and 56 years, respectively. Out of 500 women in our study , 419 (83.8%) women gave no history of OCP use earlier while 81 (16.2%) used OCPs in their life. The study shows that women who used OCPs were found to have mean age at menopause  $46.71 \pm 7.30$  years which was slightly earlier than the women who never used OCP in their life  $47.10 \pm 4.96$  years. There was no significant difference in mean age at menopause according to use of OCPs ( $p=0.552$ ).

Out of 500 women in our study , 124 (24.8%) had haemoglobin level  $< 11$  while the remaining i.e. 376 (75.2%) women had haemoglobin status  $\geq 11$ . The mean age at menopause for anemic women was  $47.29 \pm 6.05$  years while that for non anemic women was  $46.95 \pm 5.17$  years . There was no significant difference in mean age at menopause according to the anemic status ( $p=0.543$ ). This finding was comparable with the study conducted by Potsangbam R et al (2016)<sup>[18]</sup> who concluded that there was no significant difference in mean age at menopause according to the anemic status ( $p=0.437$ ) .

#### CONCLUSION:

1. The mean age at menopause in the women of Uttar Pradesh is  $47.04 \pm 5.40$  years.
2. Urban females, earlier menarche, multiparity, higher family's monthly income, higher socioeconomic status, obesity and sedentary lifestyle was associated with later age at menopause.
3. Women's occupational status had no effect on age at onset of menopause.
4. Smokers, diabetic and hypertensive women had earlier menopause.

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