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# AGE AT NATURAL MENOPAUSE AND ITS ASSOCIATED FACTORS AMONG URBAN BRAHMIN FEMALES OF DISTRICT PANCHKULA, HARYANA

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**ABSTRACT**

The present study aims to examine the age at menopause and its associated factors among Brahmin females of District Panchkula. A cross-sectional sample of 252 Brahmin females ranging in age from 40 to 75 years and residing in urban areas of District Panchkula was collected using purposive sampling method. Median age at menopause as computed using *status quo* method was 51.05 ± 4.49 years, while mean age at menopause calculated by retrospective method was found to be 50.03 ± 4.11 years. Menopausal status of the Brahmin females showed non-significant association with their dietary habits but significant association with their income, educational and occupational status. Findings reveal that, in general early age at menarche seems to be associated with comparatively later age at menopause among Brahmin females except for 13 years.

***Keywords:*** Brahmin, Menarche, Menopause, Retrospective, Status quo.

## INTRODUCTION

Menopause is the second most important milestone in a women's life after menarche. The latter signifies the initiation of menstruation while the former simply means permanent cessation of menstruation. Menopause does not occur suddenly; rather it is a gradual process which may be characterized endocrinologically by evidence of decreasing ovarian activity, biologically by decreasing fertility and clinically by alterations in menstrual cycle intervals along with variety of symptoms. Natural menopause is recognized to have occurred after 12 consecutive months of amenorrhea, for which there is no other pathologic or physiologic cause (WHO, 1981). It is physically related with decline in estrogen secretion resulting from loss of ovarian follicular activity (Willian *et al*., 2002). Menopause can also be induced by either surgery, i.e. removal of the uterus (hysterectomy) or removal of the ovaries

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(oophorectomy), or medical treatments like radiotherapy or chemotherapy. This type of menopause is usually referred to as surgical/medical or artificial menopause.

Age at menopause is primarily a biologically influenced variable, but there exists population as well as ethnic differences in this biological milestone. Natural menopause occurs between the age of 45 and 55 years with mean age of incidence around 50-51 years as documented in various literatures all over the world. The mean age at menopause in India has been reported to be anywhere between 44-49 years (Singh and Bhaduri, 1969; Sethi *et al*., 1996; Mastana, 1996; Shah, 1998; Prakash, 1999; Aryal and Yadava, 2005; Piplai, 2006; Puri *et al*., 2008), is lower than global average menopausal age. It is generally agreed that contemporary industrialized populations demonstrate a later median age at menopause than populations that are non-industralized or developing (Leidy, 1996; Sharma *et al*., 2007; Kaur and Talwar, 2009). The median or mean age at menopause has been reported to be between 47 to 52 years in the developed countries and about 43 to 50 years in the developing countries with some women reaching menopause as early as their thirties and a few in their late fifties (Richardson, 1993; WHO, 1996, Mastana, 1996; Aryal and Yadava, 2005; Kriplani and Banerjee, 2005; Jahanfar, *et al*., 2006). Age at menopause has been found to be influenced by number of factors such as age at menarche, marital status, parity, education, occupation, family history, rural-urban residences, reproductive history, socio- economic status, physical activity, dietary habits, smoking, general health behavior, geographical and climatic factors (Kaw *et al*., 1994; Mastana, 1996; Leidy, 1996; Hidayat *et al*., 1999; George, 2000; Kangas, 2000; Hardy *et al*., 2000; Harlow and Signorello, 2000; Gold *et al*., 2001; Remez, 2001; Aryal and Yadava, 2005; Murabito *et al*., 2005; Syamala and Svakami, 2005; Sievert, 2006; Puri *et al*., 2008; Kaur and Talwar, 2009). These factors may have important implications on menopausal age but there is no consistent association between these factors and onset of menopause. Menopausal age serves as a biomarker for subsequent disease prediction and mortality (Cooper and Sandler, 1998). Earlier age at menopause is associated with increased incidence of osteoporosis and cardiovascular diseases while delayed menopause is related to increased risk of breast cancer and endometrial cancer (Matthews *et al*., 1989; Kelsey *et al*., 1993; Sowers and La Pietra, 1995; Hidayat *et al*., 1999; Adler, 2000; Khosla and Riggs, 2005; Mahajan *et al*., 2012). With the advent of modernization and industrialization, there has been an increase in the age at menopause as compared to the earlier studies reported by various researchers. Better medical facilities have led to an increased life expectancy. On an average, women could now spend approximately 25 to 30 years in post menopausal stage, which could present future challenges to public health care system as post menopausal years are associated with onset of a number of medical conditions. According to Census of India (2011), there were about 96 million women aged 45 years and above and this number is expected to increase to 401 million by 2026. Therefore, more studies should focus on recent trends on menopausal age with emphasis on factors affecting menopause in Indian women. To augment research in this direction, the present study has been undertaken to evaluate age at natural menopause and its associated factors among urban Brahmin females of District Panchkula, Haryana.

## MATERIAL AND METHODS

The present study was conducted on a cross-sectional sample of 252 urban Brahmin females residing in District Panchkula, ranging in age from 40 to 75 years in order to estimate their age at menopause and its relationship with various factors. The data were derived from Panchkula city. Women who had either attained menopause (had no menstruation in last 12 months) or those who were passing through the peri-menopause phase were included in the present study. The selection of subjects was done using purposive sampling method. The determination of age at menopause was done using *status quo* and retrospective methods. The age at menarche was determined using recall or retrospective method. Although, this method is subjected to unknown degrees of bias and inaccuracy (Eveleth and Tanner, 1990), yet it is the only way to obtain information on an event which has not happened in the recent past. Only apparently healthy individuals, who were not suffering from any chronic disease or physical deformity, were included in the study. All cases (15) of simple hysterectomy in the sample collected were excluded while calculating the median and mean age at menopause. Information on socio-economic factors along with food habits was taken using interview based schedule. The ascertainment of age was done from date of birth which most of the females could recall and was further confirmed from the documentary proof of the same in the form of aadhar card, voter ID, etc. In case of the females who didn't know the exact date of birth, their age was ascertained by associating with some important events like age at menarche, age at marriage, age at first child birth, any important festival, etc. With this cross-questioning, it was possible to ascertain nearly the correct age of the subject. Decimal age of each individual was calculated using decimal age calendar (Tanner *et al.*, 1966). Thus, the sample was arranged in seven age groups, each of five year duration.

## RESULTS

The percentage occurrence of menopause and probit values at various age groups of Brahmin females are presented in **Table 1**. The median age at menopause as calculated by *status quo* method using probit analysis was found to be 51.05 ± 4.49 years, whereas, the mean age at natural menopause as calculated by retrospective or recall method was 50.03 ± 4.11 years in Brahmin females belonging to District Panchkula. Mean age at menopause was found to be earlier than median age at menopause among the Brahmin females and statistically significant differences were found between the two values ($p=0.017$).

Although menopause is a universal phenomenon, there is considerable variation among women regarding the age of attaining menopause. It is known to be influenced by various factors- genetic parameters, health and life style, nutritional status, socio-economic status, seasonality, altitude level, age at menarche, parity, marital status, smoking and occupation, etc. The present study includes the assessment of age at natural menopause in relation to education, employment status, economic status, age at menarche, and dietary habits.

Table 2 shows relationship of menopausal status of Brahmin females with various socio-economic factors. Educational attainment is a better indicator of standard of living and level of knowledge a person may possess. Maximum percentage of Brahmin females were graduate (41.7%) followed by 32.1% females who were educated till matriculation and only 4 % were educated till higher secondary level. 22.2% females were post graduate. Females with higher educational level showed later occurrence of menopause. Chi-test revealed statistically significant association between menopausal status of sample females with their educational status ($\chi^2$= 30.028, p-value=.000*). Results of occupational status of females showed that 84.1% females were housewives, while 15.9% females were engaged in government and private jobs. Occupational status of the females also revealed significant association with their menopausal status as is evident from chi-test ($\chi^2$= 24.963, p-value=.000*). It is seen from the table that non-working females had experienced earlier menopause compared to working females. Monthly family income also revealed statistically significant association with the menopausal status of the Brahmin females ($\chi^2$= 8.350, p-value=.039*). Dietary habits of the Brahmin females revealed that maximum number of females were vegetarian (75%) and only 25% of them followed non-vegetarian diet. Age at menopause when correlated with food habits of the sample women revealed a difference of 1.33 years in the median age at menopause of non-vegetarian (48.97 years) and vegetarian women (50.30 years). Statistically non-significant association of food habits of females with their age at menopause was seen from the value of t-test. The relationship between the mean menarcheal age and the mean age at menopause in the Brahmin females of District Panchkula is depicted in the table 3. Findings reveal that women who attained menarche at 13 years exhibited earliest age at menopause. At rest of the age groups, early age at menarche seems to be associated with comparatively later age at menopause among Brahmin females.

## DISCUSSION

Menopause is a significant event in life of women as it marks termination of their reproductive cycle. It is one of the major transitional phases which may be characterized by decreased, increased or erratic type of number of menstrual cycle in a period of time followed by complete cessation of menstruation. It is a stage when menstrual cycle stops for over 12 months and there is drop in levels of female sex hormones namely, estrogen and progesterone. The average age for the onset of menopause may begin as early as 40 or be delayed to the late 50s (Khokhar *et al*., 2012). Various researchers report that women from developing countries have earlier age at menopause compared to their counterparts from developed countries (Benjamin, 1960; Hauser *et al*., 1963; Sukwatana *et al*., 1991; Mckinlay *et al*., 1992; Richardson, 1993; Wasti *et al*., 1993; Ismael, 1994; Kato *et al*., 1998; Yahya and Rehan 2002; Morabia and Constanza., 1998; Talwar and Pande, 2004, Kaur and Talwar, 2009). Studies from all over the world report that age at menopause among women has been stable at around 51 years (Polit and Larqcco, 1980; Richardson, 1993; Zulkefi *et al*., 2003; Sharma *et al*., 2007). However, exact age at which menopause occurs

varies from population to population. Therefore, for regional comparison, age at menopause of present sample has been compared with pre-existing data on some Indian populations (Table 4). It is evident from the table that Brahmin females of District Panchkula exhibited later age at menopause as compared to previous reported studies while earlier median age at menopause in comparison to rural and urban females from Eastern India (Dasgupta and Ray, 2009). Interestingly, Brahmin females of Panchkula exhibited later age at menopause than Brahmin rural as well as urban females of Punjab studied in 2009, which points towards secular trends. These variations in menopausal age among different populations may be attributed to differences in socio-economic status and geographical disparity in addition to genetic and reproductive influences. Different methods employed for calculating age at menopause may also be a cause of variation as some of the studies have computed mean age while others have calculated median age at menopause.

Age at menopause is mainly a biologically influenced variable but recent studies demonstrate that there exist a number of factors which apparently influence or modify this biological phenomenon. The factors that influence menopausal age may be grouped into different categories but mainly revolve around themes such as biological factors (heredity, family history, reproductive span, prior pathologies etc.); socio-economic and demographic factors (education, occupation, marital status, reproductive history, economic status); lifestyle factors (physical activity, nutrition, smoking, alcohol consumption, general health behavior); and geographical factors (Climatic conditions, altitude, etc).

Variation in age at menopause of different samples might also have its origin in ethnic differences. Nutritional habits vary from population to population which form the basis of these ethnic disparities (Kaur and Talwar, 2009). However, food habits of Brahmin females revealed non-significant association with their age at menopause. The results of the present study are in line with findings of Talwar and Pande, (2004). In the present study, socio-economic factors showed significant association with menopausal status of Brahmin females. Education is considered as one of the influential factor in reproductive behavior (Josipovic, 2007). Various studies have reported that early age at menopause is associated with lower educational level of the females (Luoto *et al.*, 1994; Gold *et al.*, 2001; Brett and Cooper, 2003; Ozdemir and Col, 2004; Syamala and Sivakami, 2005; Dorjgochoo *et al*., 2008; Kaczmarek, 2007; OlaOlorun and Lawoyin, 2009). Sethi *et al*. (1996) indicated that higher educated women attain late menopause. Murugan and Vanaja (2015) also showed similar results among females of District Kanyakumari, Tamil Nadu. The results of the present study are also in consensus with these studies.

Many studies have shown that occupational status of females is associated with menopausal status of women. Few researchers have reported that employed women have a slightly earlier age at menopause (Mckinlay *et al*., 1972; Brand and Lehert, 1978), while others reveal that working women experience delayed menopause (Torgerson *et al*., 1994; Luoto *et al*., 1994; Sethi *et al*., 1996, van Noord *et al*., 1997;

Neslihan *et al*., 1998; Sidhu, 2003; Sidhu *et al*., 2005; Khokhar *et al*., 2012; Murugan and Vanaja, 2015). The present study also reveals late occurrence of menopause in employed females than unemployed females which is in agreement with these studies. In contrast, Talwar and Pande (2004) reported non-significant association between age at menopause and occupational status of Khatri females of Chandigarh. This difference in the age at menopause between employed and unemployed females may be attributed to better financial and living conditions of working women (Sethi *et al*., 1996). Economic status of the Brahmin females of the present study also shows significant association with their menopausal status. Lower socio-economic status is associated with early menopause in comparison to higher socio-economic status (McKinlay *et al*., 1972; Magursky *et al*., 1975; Randhawa *et al*., 1987; Stanford *et al*., 1987; Whelan *et al*., 1990; Torgerson *et al*., 1994; Nagata *et al*., 1998; Neslihan *et al*., 1998; Ozdemir and Col, 2004). Present study also reveals significant association of economic status of Brahmin females with their menopausal status. On the contrary, Pathak and Parashar (2010) reported that socio-economic factors including educational level and income does not influence the occurrence of early or late menopause in Punjabi women from Chandigarh.

Mishra (2011) stated that women who attain early menarche are more likely to have menstrual problems which in turn may lead to gynecological problems and sub fertility in them thus disposing them towards early menopause. Some studies suggest that age at menarche significantly associates with menopausal age as women who attain menarche at an early age may achieve early menopause (Chatterjee *et al*., 1989; Ginsburg, 1991; Cramer and Xu, 1996; Gonzales and Villena, 1997; Meschia *et al*., 2000; Reynolds and Obermeyer, 2003). Various researchers reported that earlier age at menarche correlated with later age at menopause among women (Sethi *et al*., 1996; Talwar and Pande, 2004; Kaur and Talwar, 2009, Pathak and Parashar, 2010.The present study also revealed similar results at all ages except for 13 years where early age at menarche displayed earliest age at menopause. Menopausal age is more sensitive to intrinsic factors, for instance reproductive history of individuals while, age at menarche is more closely related to extrinsic factors such as the living conditions, nutritional requirements, etc of an individual (Frederic *et al*., 2001).

Menopause is a major transitional phase that brings about change in the quality of life of a woman in their later period. The cohort of postmenopausal women is increasing in India. With the increase in life expectancy, post-menopausal health demands due importance. Therefore, it is essential to educate women about menopausal issues and life in menopause. Efforts are required to create awareness regarding physical, nutritional, psychosocial and emotional needs of post menopausal women. More regional and national studies should be undertaken to study secular trends for age at menopause. In India, variations in terms of ecology, ethnicity, socioeconomic status, cultural norms, social values, as well as distribution, availability and accessibility of health care resources have an impact on lifestyle, health status and health care practices of people. Thus, differences are expected in

problems experienced during menopause and morbidity profile of females during postmenopausal life. Elaborate large scale studies are needed to identify the factors associated with onset of menopause and to evaluate their role on menopause transition so that necessary measures can be taken to make the postmenopausal phase comfortable for women.

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**Table 1: Percentage of Brahmin females (Menopause occurred) by chronological age and their age at menopause**

| *Age (in Years)* | *Total Number of women* | *Number of women (Menopause Occurred)* | *Percentage* | *Probits* |
|---|---|---|---|---|
| 40-45 | 38 | 7 | 18.4% | 4.09 |
| 46-50 | 38 | 27 | 71.1% | 5.56 |
| 51-55 | 36 | 30 | 83.3% | 5.96 |
| 56-60 | 37 | 37 | 100% | - |
| 61-65 | 36 | 36 | 100% | - |
| 66-70 | 37 | 37 | 100% | - |
| 71-75 | 30 | 30 | 100% | - |
| | Mean age= 50.03±4.11 | | Median age=51.05±4.49 | |

**Table 2: Distribution of socio-economic variables based on menopausal status of Brahmin females of District Panchkula**

| *Socio-Economic Factors* | *N* | *Menopause Status* | | | | $\chi^2$, *df, p-value* |
|---|---|---|---|---|---|---|
| *Education Status* | | *Occurred* | | *Not Occurred* | | |
| | | *N* | % | *N* | % | |
| 10th | 81 | 80 | 98.7 | 1 | 1.3 | 30.028,3,.000* |
| 12th | 10 | 8 | 80 | 2 | 20 | |
| Graduate | 105 | 81 | 77.1 | 24 | 22.9 | |
| Postgraduate | 56 | 35 | 62.5 | 21 | 37.5 | |
| Employment Status | | | | | | |
| Housewife | 212 | 183 | 86.3 | 29 | 13.7 | 24.963,1,.000* |
| Service | 40 | 21 | 52.5 | 19 | 47.5 | |
| Monthly Family Income | | | | | | |
| 20,000-30,000 | 12 | 10 | 83.3 | 2 | 16.7 | 8.350,3,.039* |
| 30000-40000 | 59 | 51 | 86.4 | 8 | 13.6 | |
| 40000-50000 | 80 | 70 | 87.5 | 10 | 12.5 | |
| 50000 and above | 101 | 73 | 72.3 | 28 | 27.7 | |

**Table 3: Age at menopause in relation to age at menarche in Brahmin females of District Panchkula**

| *Age at Menarche* | *Number of women* | *Mean Age ± S.D. at menopause* |
|---|---|---|
| 12 | 5 | 51.40±3.28 |
| 13 | 25 | 48.40± 5.15 |
| 14 | 61 | 50.23±4.31 |
| 15 | 75 | 50.36±3.62 |
| 16 | 32 | 50±4.08 |
| 17 | 6 | 49.83±3.5 |

**Table 4: Mean/Median age at Menopause of Brahmin females in comparison with different population groups of India**

| *Population/ Study area* | *Sample Size (N)* | *Age at Menopause* | | *Author (s)* |
|---|---|---|---|---|
| | | *Mean Age* | *Median Age* | |
| Lobana females of Punjab & Haryana | 180 | 47.98 | —— | Mastana (1996) |
| Khatri females of Chandigarh | 201 | 49.9 | 49.5 | Talwar & Pande (2004) |
| Punjabi educated women from Amritsar | 539 | —— | 47.54 | Sidhu *et al. (2005)* |
| Rural females from North India | 558 | 44.10 | —— | Singh & Arora (2005) |
| Baroda females | 30 | 44.59 | —— | Nagar & Dave (2005) |
| Northern Indian females | 300 | 46.7 | 48 | Kriplani & Banerje (2005) |
| Urban Women from Jammu | 117 | 47.35 | —— | Sharma *et al*. (2007) |
| Urban Women from Chandigarh | 302 | 45.3 | —— | Puri *et al.* (2008) |
| Rural Women from Chandigarh | 226 | 43.8 | —— | |
| Rural Punjabi Brahmin females | 450 | 48.22 | 48.98 | Kaur & Talwar (2009) |
| Urban Punjabi Brahmin females | 420 | 49.3 | 50.12 | |
| Uttarakhand females | 129 | 45.02 | 46.82 | Kapur *et al.* (2009) |
| Rural Women from Eastern India | 110 | 53.9 | —— | Dasgupta and Ray (2009) |
| Urban Women from Eastern India | 70 | 51.39 | —— | |
| South Indian Feamles | 352 | 48.7 | —— | Bairy *et al*. (2009) |
| Punjabi women of Chandigarh | 564 | 47.91 | —— | Pathak & Prashar (2010) |
| Urban Nagpur | 250 | 49.56 | —— | Sagdeo & Arora (2011) |
| Rural Nagpur | 250 | 48.56 | —— | |
| Rural females of Gujarat | 147 | 47.74 | —— | Christian *et al*. (2012) |
| Urban females from Shimla | 100 | 44.54 | —— | Mahajan *et al*. (2012) |
| Punjabi Working Women of Jalandhar | 265 | 46.55 | 46.06 | Khokhar *et al*. (2012) |
| Urban Women of Patiala and Chandigarh | 318 | —- | 43.5 | Kaur *et al*. (2014) |
| Rural Women of Varanasi | 117 | 47.35 | —— | Srivastava *et al*. (2015) |
| Suburban Women of Chennai | 500 | 44.6 | —— | Priyadharshini *et al*.(2014) |
| Women from Jamnagar | 300 | 46.3 | —— | Sarkar *et al*. (2014) |
| Women from Gauhti, Assam | 200 | 46.35 | —— | Alakananda *et al*. (2015) |
| Urban Women from Agra | 218 | 48.26 | —— | Garg *et al*. (2015) |
| Urban Brahmin Females of District Panchkula | 252 | 50.03 | 51.05 | Present Study |

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