Chapter - 2
Review of literature

Menopause: historical perspective

Menopause as a life event was recognized far back in history. Aristotle (385-322 B.C.) noted that menstruation ceased at age 40 years, and references to the cessation of the age of fertility continued to pepper the literature over the next 2000 years (O’Dowd and Phillipp, 1994). The Greek word *men* and *pausis* first utilized to describe the cessation of menstruation. *Climacteric* appears to be a Greek derivation representing the word for ladder or steps of a ladder. The review of literature over the last century make one wonder whether women were meant to be climbing up or down the ladder (Wilbush, 1979). Viewpoints on one extreme were particularly negative; on the other hand, there were some balanced observers attempting to define the normality or universality of the phenomena of menstrual cessation (Utian, 1997). Like rest of the world, there is hardly any reference to menopause in ancient Indian texts, treatise or epics. However, there are elaborate descriptions about menstruation, menarche and code of conduct for men and women during menstruation.

Data concerning the age at menopause during the classical era are not quite plentiful as those dealing with menarche. As with menarche the earliest noted references to the age at menopause appears in the Aristotelian writing and the Hippocratic corpus Aristotle (385-322 B.C.). *Historia Animalium* (VII, 5, 585 a):

“The beginning of child bearing in women and the capacity in men to impregnate and the cessation of each of these coincide with the emission of seed in the one and the menses in the other........ The menses cease in most women around the fortieth year, and in those in whom it goes on longer, the menses continue until the fifth year, and at this time some women of that age have borne children; but not beyond that age”.

Else where Aristotle (*Politics* VII, 14, 1335 a) wrote:
“Generally speaking, for the most part....... Fifty marks the limit of the capacity of reproduction in women”.

Pliny of Elder (1st cent. A.D) briefly mentions the age of menopause in his Historia Naturalis, (VII, xvi, 61):

“A woman does not bear children after the age of fifty, and with the majority menstruation ceases at forty”.

Beginning with Soranus (1st/ 2nd cent. A.D.) the age at menopause more adequately discussed Gynaeciorum (I, iv, 20):

“The amount of flow beginning from a little increases and remains constant for some time, diminishes again and thus ceases completely, with the majority neither earlier than the fortieth year nor later than fiftieth”.

Oribasius (4th cent. A.D) indicates wider variance in the age of menopause as well as a later average age Eclogae Medicamentorum (142):

“The menses cease around the fiftieth year, very few menstruate until sixty and in some, especially those who are very fat, menses begin to abate from the thirty-fifth year”.

The physician Aetius (6th cent. A.D) gives generally the same range as Oribasius Tetrabiblos, XVI, iv

“The menses do not cease before the thirty-five year nor appear after fiftieth; rarely some menstruate until the sixtieth year. Those who are very fat cease early”.

The age at menopause in classical period has previously been reported according to available records as probably 40-50 years (Amundsen & Diers, 1970). Backman (1948) concludes that menopause began about the age of 40 in ancient times, and at the age of 45 years in the medieval age at beyond until Nineteenth Century. Table 1 summarizes the data given by the classical and medieval sources for the age at menopause.
Table 1: Summary of the age at menopause according to classical and medieval sources

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<th>Author</th>
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<td>Diocles</td>
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<td>Hippocratic Corpus</td>
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<td>Trotula</td>
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<td>Hildegard</td>
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<td>Thomas of Cantimpre</td>
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<td>Gilbertus Anglicus</td>
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<td>Bartholomaeus Anglicus</td>
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<td>John of Gaddesden</td>
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International status

Age at menopause

The age at which natural menopause occurs is between 45 and 55 years for the women world wide. Some variability exists between developed and developing countries. A number of studies have reported that women in developing countries reach menopause earlier than women in industrialized nations. The age of menopause has been seen to vary from one population to
another as well as between different ethnic groups within the same geographic region (WHO, 1981, 1996). There has been a significant decline in the age at menarche over the past 100 years (Tanner, 1962; Diers, 1974). Similarly four years’ increase in the age at menopause over the past 100 years has been suggested (Frommer, 1964; McKinlay et al, 1972). From a study in Finland, Luoto et al., (1994) reported a steady increase in the age at menopause from 47.9 years in 1897 to 51 years at present. On the other hand, McKinlay (1996) found no secular trend in a population based study including women aged 45 to 55 years in 1985 in Massachusetts. Flint’s (1978) revision suggests that there could have been a secular trend in age at menopause in populations from industrialized countries in the last 100 years. This could be confirmed by longitudinal studies of the type carried by Van Noord et al., (1997), who described a small secular trend in cohort of Dutch women born between 1911 and 1925. This secular trend in menopause may also be irreversible, like that in menarche. Cassou et al., (1997) described a significant reduction in the age at menopause in French women born between 1938 and 1943 due to the deterioration of living conditions during the Second World War. However, other authors Gray (1976), McKinlay et al., (1985) deny that such a secular trend has arisen, thus attributing less influence to environmental factors on the process of reproductive ageing. A recent community based study of Chuvashian women living in a rural area of Central Russia also determined a trend over time of increasing age at menopause among women born between 1920 and 1950 (Kalichman et al., 2007). Flint (1978), suggested that secular trend in age at menopause is due to an improvement in medical care and standard of living. This suggestion was confirmed in some studies by Rodstrom et al., (2003) and Van Noord et al., (1997) and denied in others (McKinlay et al., 1992).

The age at menopause in developed countries range from 49.3 to 51.4 years, whereas, in developing nations the age at natural menopause is reported to be 43.5 to 49.4 years, with majority of the estimates closest to the lower part of the range. The extent, to which these differences are due to biological, nutritional or environmental factors or to variation in data collection and
statistical methods, is a matter of investigation. Cramer and Xu (1996) suggest that reported differences in age at menopause between developed and developing countries may primarily be due to methodological differences.

The estimates of average age at menopause in United States ranges from 49 to 52 years (MacMahon and Worcester, 1966; Tréloar, 1974, and Gold et al., 2001), although most estimates of age at natural menopause in United States are based on samples of White women. The Study of Women's Health Across the Nation (SWAN) has estimated median age at menopause for multiethnic sample of US women to be 51.4 years (Gold et al., 2001). Many researches suggests variation in the age at menopause among different ethnic groups (MacMohan and Worcester, 1966; Bromberger et al., 1997; Berg, 1999; Garcia et al., 1987). The age at menopause of Hispanic women in SWAN was estimated to be 51.0 years, but this population included a heterogeneous sample of Cuban American, Mexican American, Dominican, Puerto Rican, South American, Central American and Spanish women (Sower et al., 2000). Two previous studies also suggested that African American women experience menopause 6-12 months earlier than Caucasians, with median age of 49.3 years. The African-American in both studies (Bromberger et al., 1997 and Mac Mahon and Worcester, 1966) in contrast to study by Gold et al., (2001) on five racial/ethnic groups in seven US centers based on cross-sectional study show no difference between African-American and Caucasians. Studies on age at menopause in South Africa is 50 years (Frere, 1971), 48 years in Ghana (Kwawukume et al., 1993) and 52.8 years in Nigerian women (Otolorin et al., 1989).

Several studies have described the age at menopause in Latin America (Onatra, 1994; Luzardo, 1970; Rojas, 1993; Gonzales and Villena, 1995; Pedro et al., 2003; CEPAL-ECLAC, 2003; Blumel et al., 1990). One of the first surveys done in South America pointed out that the age at onset of menopause among Colombian women was 47 years (Luzardo, 1970). Studies in Mexico and Peru have estimated median age at menopause to be 48.2 years among women of Leon, Mexico (Gracia et al., 1987) and 47.1 years
women of Lima city, Peru (Gonzales et al., 1997). However, a more recent study of Mexican women reported higher estimates, i.e., 49.6-50.0 years (Sievert, 2003).

Hospital based sample of 270 women in Southern Thailand reported that the average age of the postmenopausal women was 48.74±3.07 years (Peeyananjarassri, et al., 2006). A study done in seven South-east Asian countries namely Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore and Taiwan reported the median age of 51.09 years for menopause (Boulet et al., 1994).

The age at menopause in women of Yazd, Islamic Republic of Iran is 47.39±5.09 years (Fallahzadeh, 2007), whereas, women of Shiraz reported to have menopausal age 48.30±5.3 years (Ayatollahi et al., 2005). Egyptian women seem to reach menopause at an earlier age as compared to their western counterparts. In a retrospective study of 300 Alexandria women, Hidayet et al., (1999) found that mean age at natural menopause was 46.70±5.44 years. Whereas, the mean age of menopause for countries like Turkey is 46.24 years (Beser et al., 1994), United Arab Emirates (Rizk et al., 1998) is 47.3±3.29 years, Beirut, Lebanon is 49.3 years (Reynolds and Oberymer, 2001), and 48.4 years in Morroco (Reynolds and Oberymer, 2003).

Mean age at menopause in various ethnic samples of Israel (comprising East European, West European, North African, Israeli and other Middle eastern) women is reported as 49.4±2.9 years (Neri et al., 1982). Median age at menopause among the urban and rural Iranian women are 49.9 years and 49.2 years, respectively. However, mean age at menopause in total population is 50.4±4.3 years (Mohammad et al., 2004). Italian Climacteric Research Group Study (ICARUS) conducted a prospective study on Italian women and observed a mean age of menopause as 50.9 years (Meschia et al., 2000).

Studies have reported that age at menopause for Japanese women was similar to that for Caucasian women (Boulet et al., 1994). One study of 2,221
Japanese women reported a median age at menopause of 50.4 years. (Tamada and Iwasaki, 1995). Another study of 400 Malaysian women reported almost similar age at menopause of 50.7 years (Ismael, 1994). However, a study of 2,354 Thai women aged 45-49 years from Bangkok Health centers in lower-middle socioeconomic status areas, reported a median age at menopause of 49.5 years (Chompootweep et al., 1993).

Urban women living in Karachi, Pakistan, reported menopause at an average of 47 years (Wasti et al., 1993). Mayan women reported to have attained menopause at 45 years (Beyenne, 1986). Filipino Malay women were observed to have menopause at 47-48 years (Ramoso, 1994). A number of reports tend to indicate that women living in developing countries including Indonesia, Pakistan, Chile, Peru and India experience menopause several years earlier than those in developed countries (Blumel et al., 1988; Wasti et al., 1993; McCarthy, 1994; Samil and Wishnuwardhani, 1994; Gonzales and Villena, 1997).

The timing of the menopause is associated with multiple health outcomes in populations. Early age at menopause has been associated with higher all-cause mortality (Cupper and Sandler, 1998; Snowdown et al., 1989; Jacobsen et al., 2003), excess mortality from cardiovascular diseases (Van der Schouw et al, 1996) and as a risk factor for heart disease (Hu et al., 1999) and osteoporosis (Kritz-Silverstein and Barret-Connor, 1993). Late age at menopause has been linked to an increased risk of breast cancer (Kelsey et al, 1993) and endometrial cancer (Kelsey et al., 1982). Some studies suggest that women are getting their menopause in younger age because of many common and socially important diseases that cause early and premature menopause (Boianov et al., 2001; Gold et al., 2001). The timing of natural menopause may serve as a marker for the process of reproductive ageing (Nilsson et al., 1997). It may also serve as an indicator of population health, as the occurrence of menopause indicates the increased risk for the onset of several chronic diseases (Sievert, 2001; Mondul et al., 2005).
Factors influencing menopause/age at menopause

There are various bio-social factors/variables which are believed to be associated with menopause/age at menopause, like, body size and shape, blood pressure, age at menarche, socioeconomic status, marital status, age at first birth, induced and spontaneous abortions, parity, income, education, women’s occupation and dietary habits. For the sake of convenience these variables may be grouped as anthropometric, physiological, and socio-economic and life style characteristics.

**Anthropometric characteristics:** Numerous studies carried out in diverse populations have demonstrated a relationship between body weight and/or Body mass index (BMI) and age at natural menopause. Most of these studies indicate that thinner and shorter women report a slightly earlier age at menopause as compared with heavier and taller women (Beall, 1987; Brand and Lehert, 1978; Lindquist and Bengtsson, 1979; MacMahon and Worcester, 1966; Neri et al., 1982; Shreman, 1981; Willet, et al., 1983). When an age at menopause is shown to have a positive correlation with body weight/ BMI, it is said that menopause occurred later in heavier women because of increased conversion of an adrenal androgen to estrone in adipose tissue (Mole et al., 1989; Cassey and MacDonald, 1983; Poortman et al., 1981). There is a tendency to put on weight after menopause which is predisposing factor for several other chronic diseases like Cardiovascular diseases (CVD), Hypertension, etc. Seventy percent women of age 45-54 years are over weight or obese. Before the age of 50, majority of women tend to increase their weight slowly, whereas after menopause there appears to be an accelerated increase in fat mass and a change in preferential fat storage to a central part of body that is abdominal locations (Evans, 1998).

The transition from premenopause to postmenopause status has been associated with changes in body composition. Mostly, there is an increase in central adiposity, particularly in visceral fat, but the findings are not consistent for weight gain (Ley et al., 1992; Tremolliers et al., 1996). It is still unclear whether the central deposition of fat and weight gain are continuous
processes from premenopause to postmenopause period, or if they occur at menopause transition or in early postmenopause (Bjorkelund et al., 1996; Toth et al., 2000).

There are relatively few data on changes in adiposity and fat distribution associated with menopause in women. This is an important issue because of the relationships that have been noted between obesity and cardiovascular diseases (Manson et al., 1995), and obesity and certain cancers (Austin et al., 1991; Colditz, 1993) in postmenopausal women. As noted above, body weight reaches its maximum in women very near the time of menopause, and there is an increase in relative adiposity for any given weight or BMI. While some studies find that the increase in weight accompanying menopause is more related to age than menopause itself. (Wing et al., 1991; Wang et al., 1994), others have noted specific menopause-related increase in BMI, overall adiposity and intra-abdominal adiposity (Ley et al., 1992; Kotani et al., 1994; Pasquali et al., 1994; Svendsen et al., 1995; Espeland et al., 1997). A longitudinal study that followed 35 women aged 44-48 for 6 years (Poehlman et al., 1995) found that those women who experienced menopause during the period of follow-up lost significantly more Fat Free Mass (FFM), and greater increases in fat mass, Waist-hip-ratio (WHR) and insulin. The changes were associated with greater reductions in physical activity and resting energy expenditure in post menopausal women.

**Physiological characteristics:** The age at menarche and age at menopause relationship is consistent with the hypothesis that reproductive factors influencing the number of ovulatory cycles are associated with age at menopause (Ginsburg, 1991; Cramer and Xu, 1995), but at odds with the hypothesis that later ages at menarche result in earlier menopause (Frisch, 1989). Recent study by Reynolds and Obermeyer (2003) on Moroccan women showed that age at menarche was significantly associated with age at menopause, with women reporting early age at menarche also having an early age at menopause. Similar findings were also observed by Ku et al., (2004) on Korean women. The finding of a direct (as opposed to inverse)
correlation between an early age at menarche and menopause has been reported in other studies conducted in developed and developing countries. Gonzales et al., (1997) found that menarche at or before age 11 is associated with an earlier age at menopause in Peru. A direct effect (early menarche, early menopause or late menarche, late menopause) was also reported in Italy (Meschia et al., 2000) and India (Chatterjee et al., 1989). A statistically significant inverse relationship between menarche and age at menopause (early menarche, late menopause) was described in Australia (Do et al., 1998). However, most other studies failed to find any significant association between the age at menarche and age at menopause (Jaszmann et al., 1969; Mckinlay et al., 1972; Treloar, 1974; Magursky et al., 1975; Neri et al, 1982; Chompootweep et al., 1993; Van Noord et al., 1997; Hidayet et al., 1999).

Women after menopause have an increased risk of cardiovascular disease (Colditz et al., 1987; Witteman et al., 1989). Although blood pressure is lower in women than men before menopause, it is similar or higher thereafter (Kannel et al., 1976). At least one study suggested this and showed that diastolic blood pressure increases with the onset of menopause (Weiss, 1972). It has also suggested that menopause amplifies the age dependent increase in arterial stiffness (Takahashi et al., 2005). If menopause plays a role in causing an increase in blood pressure, it is unclear whether it is premenopausal estrogen that is protective beforehand or whether ageing, weight gain, and insulin resistance may explain the increased prevalence of higher blood pressure. The influence of menopausal age on arterial blood pressure is still unclear. In the previous reports on the issue available in the 'Medline database', systolic blood pressure levels have been found to show either, negative correlation (Lindquist and Bengtsson, 1980; Van Beresteyn et al., 1989, 1992) , or positive correlation (Staessen et al., 1989; Bunker et al., 1991) or no correlation (Hassager, et al., 1987; Armellini et al, 1990; Wu et al., 1990; Markovitz et al., 1992; Zamboni et al., 1992) with age at menopause. Contrasting evidence has also been reported for diastolic blood pressure, which has been found to be either, decreased (Van Beresteyn et al.,
1989), or increased (Hassager, et al., 1987; Staessen et al., 1989; Bunker et al., 1990) or unaffected (Lindquist and Bengtsson, 1980; Armellini et al., 1990; Wu et al., 1990; Van Beresteyn et al., 1992; Zamboni et al., 1992; Casiglia et al., 1996) due to early/late age at menopause. A very recent study by Izumi et al., (2007) demonstrated that higher blood pressure levels in post menopausal women depend on age at menopause and postmenopausal period, but not subjects’ age, suggesting that a longer absence of female gonadal steroids represents a major factor contributing to increased blood pressure in elderly women.

A high prevalence of hypertension is a natural part of ageing in postmenopausal women. Postmenopausal period is well-established as one risk factor for cardiovascular disease in women. As one example of this phenomena, the prevalence of hypertension is higher in males who are 30 to 45 years old than in females of similar age, while prevalence of hypertension in females after menopause or during menopause increases to levels similar to or exceeding that in males (Volonas, et al., 1988; Burl et al., 1995). Study by Portaluppi et al., (1997) suggests that ovarian failure and duration of menopause are not direct determinants of blood pressure rise in middle-aged women. However, weight gain and BMI are also important and potentially preventable determinant of increased blood pressure and risk of hypertension in these women. A study on Norwegian women by Graff-Iversen (2008) reported that menopausal status was not associated with adverse development of blood pressure or body weight. Furthermore, several studies describing a blood pressure increase with menopause have found to be explained by age (Casiglia et al.,1996) or by BMI (Grobbbee et al., 1988; Shelley et al., 1998) or both (Zanchetti et al., 2005).

**Socio-economic and lifestyle characteristics:** Gold et al., (2001) in multiethnic sample of US women found that lower educational attainment and non-employment were significantly and independently associated with age at menopause. Several previous studies indicate that lower educational attainment and lower socio-economic status, often determined by
occupational status of the women or their husbands is associated with earlier age at menopause (Stanford et al., 1987; Togerson et al., 1994; VanNoord et al., 1997).

A cross-sectional study on 363 women aged 50-56 years who visited health centre in Ankara, Turkey, showed that there is no association between age at natural menopause with marital status, employment status and household income. However, less educated women have reached menopause early as compared to the more educated (Ozedemeir and Col., 2004). Some studies have found that a higher educational status and socio-economic status is associated with later age at menopause (Do et al., 1998; Johnston, 2003). However, there are others who found an inverse relationship (Luoto et al., 1994; Gold et al., 2001) while some found no correlation at all (Arshat et al., 1989; Reynolds and Obermeyer, 2003; Ku et al., 2004). A review study by Harlow and Signorello (2000) found no conclusive evidence regarding the effect of education, marital status and rural/urban living. Education attainment, one of the prime indicators of socio-economic status in Poland (Marody, 2003), was found to be significantly associated with timing of menopause. Women with higher levels of education experienced later menopause, whereas a low level of education was found to be risk factor for early menopause. A similar relationship was observed among Finnish women (Louto et al., 1994). However, Brambilla and Mckinlay (1989) did not find any effect of education on age at menopause. A Turkish study (Beser et al., 1994) reported that women, who were more educated, currently separated or widowed, and lived in an urban location were more likely to experience an earlier age at natural menopause.

Working women experience early age at menopause than non-working women as reported by Hidayet et al., (1999) in a community based study on Alexandria women, in Egypt. Krisch (1982) also noted that German working women had an early age at menopause as compared to the non-working women in higher socio-economic status of the society. Whereas, Louto et al., (1994) reported delayed age at menopause among the working women in
Finland. Recently, Cassou et al., (2007) reported that working women and work related factors are associated with late age at menopause. On the other hand, Eshra et al., (1989) reported that occupational status of the women did not affect menopausal status.

Prior use of oral contraceptives (OCs) was associated with earlier age at menopause, although no relation with increasing duration of use of OCs was observed (Gold et al., 2001). This finding is consistent with those of some prior prospective studies (Gonzales and Villena, 1997; VanNoord et al., 1997) but inconsistent with other results (Bromberger et al., 1997; Hardy and Kuh, 1999). Since the onset of menopause is categorized to be related to the rate of loss of oocytes and thus to the occurrence of ovulatory cycles (Standford et al., 1987; Whelan, 1990; Cramer and Xu, 1995), the proposed mechanism by which 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. The possibility that women have interrupted ovulatory cycles, or a modified rate of follicular atresia through oral contraceptive use, resulting in later age at menopause (Reynolds and Obermeyer, 2003).

Menstrual cycle length, parity and oral contraceptive use are key determinants of lifetime number of ovulatory cycles, and the individual effects of these variables on the age at menopause has been investigated in many studies. Shorter cycle lengths, particularly during early reproductive years, can decrease the age at natural menopause by 1 to 2 years (Whelan, 1990). Ovulation is interrupted by pregnancies or oral contraceptive use. A few studies have shown an earlier age at menopause among women with no history of oral contraceptives use (Jeune, 1986; VanKeep et al., 1979). Since OCs prevent pregnancies, any effect above and beyond that of other contraceptive preparations may be through the ovulation-sparing effect of the progestational content of different oral contraceptives preparations. A larger study conducted in The Netherlands recruiting 4589 postmenopausal women found no correlation between oral contraceptives and age at menopause.
(Vries et al., 2001). There are studies which have shown oral contraceptive pills’ use is associated with late menopause (Henriquez et al., 1994; Reynolds and Obermeyer, 2001). Ayatollahi et al., (2003) have found an inverse correlation between oral contraceptive pills and age at onset of menopause.

Parity is defined as the number of live births after seven months of pregnancy. Many studies have found that nulliparous women are at greater risk of early menopause and the trend of late menopause was observed with increasing parity (Willett et al., 1983; Jeune, 1986; Stanford et al., 1987; Whelan et al., 1990; Beser et al., 1994; Bromberger et al., 1997). A study on 1262 Puerto Rican women aged 40-59 years reported that working women and high parity were associated with later age at menopause (Ortiz et al., 2006). From the above studies it may be concluded that multiparity is associated with later onset of menopause and nulliparity with earlier menopause. The explanation is slower depletion of follicles in multiparous women and faster in nulliparous women (Ginsburg, 1991). However, a review conducted by Thomas et al., (2001) found that fertility had an inverse effect on age at menopause. A Korean and a Moroccan study found no effect of parity on age at menopause (Reynold and Obermeyer, 2003; Ku et al., 2004).

Effect of smoking on menopausal age has been studied by Jick et al., (1977), Midgette and Baron (1990) and Mckinlay et al. (1992), and they found smokers more likely to have an early menopause. Willett (1983) found that smokers in the 45-49 year old age group to have a 1.53 years risk of a earlier menopause than non-smokers. Their study like that of Togerson et al., (1994) showed a dose response relationship between menopause and smoking with increased numbers of cigarettes consumed increasing the probability of an early menopause. Available evidence suggests that cigarettes may be antiestrogenic, disturb hypothalamic function and inhibit the enzymes aromatase and demolase (Baron, 1990) which are involved in oestrogen synthesis. In addition, female smokers have a more androgenic hormone
profile, and may more readily convert oestradiol to less active catabolites, e.g., 2-hydroxy-oestradiol.

The study by Togerson et al., (1994) noted the effect of two possible nutritional influences on the occurrence of an early menopause, i.e., alcohol use and meat consumption. This study has demonstrated an apparently surprising relationship between older menopausal age and increasing alcohol consumption. However, a previous study, among Nigerian women, has noted non-significant differences in menopausal age between alcohol consumers and non-consumers (Holte and Mikkelsen, 1991). Although the long term influence of alcohol intake on endocrine function has been little studied (London et al., 1991), there is evidence that alcohol may be oestrogenic, at moderate levels of consumption. A newly published study by Kinney et al., (2006) has reported that menopause occurs about 2 years later among women who drink alcohol 5-7 days/week. On the contrary, the study conducted on Polish women (Kaczmarek, 2007) found no association between alcohol consumption and menopause. Baird et al., (1988) noticed that women who are vegetarian had a significantly earlier age of menopause than non-vegetarians. Similar observation was also made by Nagata et al., (2000) on Japanese women. This association, between non-vegetarians and later age at menopause may reflect a direct influence of meat protein per se on hormonal function, or it could be a marker for decreased dietary fiber and increased animal fat consumption. While, the other two studies reported by Togerson et al., (1994) and Bromberger et al., (1997) found no association of diet with age at menopause.

The effects of climate and altitude have been clearly described for the age at menarche (Frisancho, 1977; Gonzales and Ortiz, 1994; Gonzales and Villena, 1996). However, little is known about the influence of altitude on age at menopause. Beall (1982) described that Tibetan speaking populations living at 3250-3560 meters in Upper Chumik, Nepal, have an earlier menopause at median age of 46.8 years.
Menopausal symptoms

Anthropological and cross-cultural studies have challenged the concept of menopause as universal phenomena, with wide variations in the symptom perception and reporting in different countries (Avis et al., 2001). Cultural explanations of these differences need to include lifestyle (diet, exercise, social factors) as well as reproductive patterns which can effect biological processes, population differences in biology, as well as beliefs and attitudes associated with menopause, and the social status of mid-aged and older women (Lock, 2005). Studies from western countries have consistently shown a high prevalence of menopausal symptoms compared to those from Asian countries, but little is known about the experience of menopause in Asian women now living in western countries.

Every woman’s menopausal experience is unique. Some women may have all of the symptoms of menopause, other may have just a few. The intensity of menopausal symptoms can also range from mild to quite severe (Wallics, 2002). During perimenopause to postmenopause, some women may experience mood swing, panic attacks, sleep disturbances, depression, anxiety, changes in tolerance to heat or cold, joints and muscle pain, allergies and headaches. Hot flashes and night sweats (Vasomotor symptoms) are characteristic symptoms during perimenopause. (Erlik, 1987; Holte and Mikklesen, 1991; WHO, 1981, 1996). An association between menopausal status and hot flashes, night sweats and insomnia has been reported in Indonesia (Agoestina and Van Keep, 1984). Two more studies in Nigeria also found an association between menopausal status and hot flashes (Otolorin et al., 1989; Okonofua et al., 1990). A study on Thai women in Bangkok reported that 23% of women with irregular menstruation had hot flashes (Chompootweep et al., 1993). This figure is almost identical with the percentage of women having hot flashes in a village in Northern Thailand (Kaufert, 1996). By contrast, a study on women in Argentina reported that 65% experienced moderate to severe hot flashes (Tieffenberg, 1993). Depending on their menopausal status, only 10-25% of Chinese women in
Hong Kong reported hot flashes and night sweats (Tang, 1993) compared with 57% of elite women in Karachi, Pakistan, but only 7% of women living in urban slum in the same city.

Researchers have also been preoccupied with determining whether women from developing countries experience the same symptoms at menopause as women in North America and Europe. The conclusion of the International Health Foundation report was that, ‘Menopause seems to be associated with fewer and less severe symptoms’ in Asia than in Western countries (Payer, 1991). The expectation that women will have hot flashes and night sweats and will become depressed and irritable at menopause is ingrained in medical and popular culture in Europe and North America (Kaufert, 1981). Flint (1974), an anthropologist, was among the first to suggest that this was not a culture necessarily shared in other societies. Other researchers have since shown that Mayan women have the same endocrine changes as North American women (Martin et al., 1993), but do not report or expect to have hot flashes (Beyenne, 1986). Another study in Northern Thailand found that women did not associate menopause with depression, but headaches (Kaufert, 1996). Japanese women anticipated headaches, shoulder stiffness, but not hot flashes or depression (Lock, 1998). Other anthropological studies which revealed differences in symptom reporting include that of Walfish et al., (1984) who found low symptom reporting among North Africans resident of Israel. Wright (1983) ascertained that although the prevalence of hot flashes was similar among a Navaho and an Anglo sample, the frequency was much lower among Navaho.

**Cultural context of menopause**

The social construction of menopause as the entry point to old age represents a challenging and often difficult time, because, while women may feel rather young and full of energy, society tends to perceive them as becoming increasingly less attractive and less fully-functioning. Especially in Western societies the time of menopause is characterized by series of losses (e.g., loss of youth, beauty, fertility, libido, health, hormones, and femininity) and there
are suggestions that it possibly impacts on physical and psychological well-being in mid-life (Brown, 1976; Kaiser, 1990; Buck and Gottlieb, 1991). In addition to this, with accumulation of knowledge on a women’s endocrine health system, views about menopause as a natural transition began to change. According to much of current medical opinion on the subject, middle-aged women are said to suffer from estrogen deficiency disease from menopause onwards (Utian, 1976). In recent years experts from fields such as sociology, nursing and anthropology have investigated menopause and contradicted notions of menopausal women as ailing and diseased (MacPherson, 1990; Estok and O’Toole, 1991). Support is gaining for the view that a woman’s menopause should not be seen as a pathologic endocrine deficiency disease; female hormones normally abate with advancing age as reproductive function comes to halt (McKinlay et al., 1992).

Anthropological research into female mid-life, although rather sparse, has amply demonstrated that the meanings and significance associated with the stage of the female life cycle are historically and culturally produced. Recent studies have gone further, and called into question several assumptions which influence research directions, medical practice, and proposed health care policies in connection with menopausal and postmenopausal women. Among these assumptions are the following: that menopause is a universal biological fact; that the incidence of symptoms associated with the end of menstruation, in particular the hot flashes, will be approximately the same among any given population of menopausal women; similarly, that all women should in effect be considered at risk for the chronic illness now commonly associated with the postmenopausal years in the West (Lock, 1994).

Several ethnographic studies analyzed the social position of women once past child-bearing age, but without discussing menopause per se. Menopause research usually demonstrated a relative improvement in social status once middle aged women were freed from menstrual taboos and others constraints placed on fertile women (Paulme, 1963; Middleton, 1966). Other studies, by contrast, demonstrated a loss in status once a woman no longer bears
children (La Fontaine, 1960). Flint’s (1990) research was the first to examine explicitly the relationship between symptom reporting at the end of menstruation and status change at mid-life. She showed that, among the Rajput of Northern India, women who no longer menstruate may emerge from purdah and move around freely within their village. Flint suggested that the symptom-free perimenopausal phase described by Rajput women could be attributed to positive change in their social lives following the end of menstruation, an event which is locally constructed in positive terms. Flint then contrasted this situation with negative stereotype associated with menopause in North America. On the basis of her work among women in Newfoundland fishing village, Davis (1983) challenged the existence of any simple association between improved or high social status and a positive attitude towards menopause. She found only that high status could act as an extra resource on which women might draw as they coped with menopause. Townsend and Carbone (1980), like Davis, emphasized the importance of assessing and not assuming local meanings attributed by individuals to mid-life status changes. Skultans (1970), who carried out research in Wales, has produced the lone study to date which shows a positive attitude on the part of women towards hot flashes.

Beyenne (1986, 1989) has carried out research into the reproductive lives of Mayan and Greek women. Her’s was the first anthropological study to classify women according to menstrual status. She found that Mayan women looked forward to the end of menstruation, and regarded the postmenopausal years positively, as opposed to the burden which is associated with childbearing years. Mayan women reported no hot flashes or cold sweats, in contrast to Greek peasant women whose pattern of symptoms reporting was similar to that of Northern Europeans. Beyenne concluded that menopause should be interpreted as a “biocultural” event. She suggests that in addition to culture, variables such as diet and reproductive histories (which, in the Mayan case, consist of numerous pregnancies, and extended cycles of amenorrhea due to prolonged lactation and malnutrition), influence the time of onset and the subjective experience of menopause. In Japan the term *Konenki* is used when...
Chapter-2 

Review of literature describing menopause. Konenki is translated as the turn (change) of life; the critical age. The word Konenki is not equivocal to the Western meaning of menopause, (strictly meaning the end-of-menses) rather it represents a much larger "life-event". The word heikei would be of more equivocal term. In Thailand, there is no specific term for menopause. The Thai terms used are ‘mod leod’, ‘mod prajumdeon’ or ‘mod radoo’ where ‘mod’ translates ‘as run out of’ and ‘leod’, ‘radoo’ or ‘prajumdeon’ mean ‘menstruation’ (Chirawatkul, 1992). The common term which can be generally understood as referring to the menopause is ‘leod cha pai- lom cha ma’. This term is an idiom literally meaning ‘The blood will go- the wind will come’. It refers to the changes in a woman’s behaviour, emotions and well-being during and after the menopause. In the Hmong women (refugees from Australia) language there is no equivalent word for menopause. The concept of menopause is understood as ‘tsis coj khaub ncawa lawm’ which literally means ‘no more menopause’. In general, menopause is associated with ‘pog laus’: the terminology used for old lady, an older person or a grandmother, and is seen as a natural part of ‘growing old’. Although Hmong women thought that menopause is a positive aspect of their lives (Rice, 1995).

Menopause and hormone replacement therapy

The idea of hormone replacement therapy (HRT) was sparked when scientist thought that if estrogen drops at menopause, it should be replaced by hormone replacement therapy. Estrogen therapy has been around since 1930s, when injections of estrogen were given for menopausal symptoms. Because of the inconvenience of this form of treatment, implant pellets of estrogen were introduced in 1938. HRT was originally called estrogen replacement therapy because only estrogen was given as the treatment. However, it soon became clear that giving estrogen alone could increase the risk of cancer of womb and breasts. So, progesterone was added to the therapy. This is called the ‘combined HRT’. HRT has been seen as a universal panacea, a solution to all menopausal problems from symptom to hysterectomy to osteoporosis. HRT is given to those women who had a
surgical menopause or who reported to have severe vasomotor symptoms, like hot flashes and night sweats. Hormone therapy (HT) frequently is used by women who undergo menopause, either naturally or surgically (Barrett-Connor et al., 2005). In middle-aged women, HT has been shown to reduce the risk of osteoporosis and to prevent the occurrence of menopausal symptoms such as hot flashes (Manson and Martin, 2001). Several studies have reported that the prevalence of HT use differs by type of menopause and that, more specifically, HT use is most prevalent among women who have undergone bilateral oophorectomy (Langenberg et al., 1997; Kritz-Silverstein et al., 2000).

National status

Menopause in plural Indian society presents diversity. Over the centuries, the short-term vasomotor and psychological problems were ignored, and long-term associations such as osteoporosis, coronary heart disease and Alzheimer’s disease never evolved because majority of women rarely crossed into middle age. Consequently, the general attitude of women in rural India, where the vast majority of the population lives, remained either indifferent or positive towards menopause. This positive behaviour may possibly be attributed to their spiritual upbringing, whereby life and its problems are linked to karma (destiny). For an Indian woman reproduction is very important; giving birth to offsprings is the prime duty, and mothering the prime role of a woman. An Indian woman’s identity is her motherhood (Sharma et al., 2005). Cessation of the ability to become a mother is of a great loss to her womanhood. She considers herself as a useless object, if she cannot reproduce. But after her satisfied reproductive years, they feel freedom from many taboos attached to menstruation, attaining greater social recognition or empowerment at an age where menopause is reached, and greater economic productivity and/or newly acquired self-esteem have played significant roles in shaping behaviour of Indian women (Flint, 1974, 1982; Kaufert, 1982; Flint and Samil, 1990; WHO, 1996; George, 1996).
Very little research has been done on menopause in the Indian context; it is only recent phenomena that physicians have begun to recognize menopause as an important issue in women’s health care. Therefore, the review of literature on national status of menopause is presented below more or less in a chronological order. Majority of past work on menopause is focused on reporting age at menopause. A review on the age at menopause of fourteen Indian samples has been presented by Taulkadar (1978); the populations are from different parts of India, such as, West Bengal, Assam, Arunachal Pradesh, Delhi and Maharashtra, etc. The lowest and the highest mean ages are observed among the Singhpho women 43.63 years (Kar and Mahato, 1975) and the Ahom women of Assam 48.44 years (Gogoi, 1972), respectively, with a range of 35 to 56 years for the 14 samples. The Sindhis of Delhi (Ghosh and Kumari, 1973) show a mean menopausal age of 44.6 years. The Punjabi Khatri of Delhi represent an age of 46.53, whereas, Jele women of Bengal, 45.4 years. The Brahmins of Maharashtra show a lower mean age of 45.8 years (Rakshit, 1962) than Brahmin (47.1 years) of West Bengal.

Flint (1974) showed that women who live at high altitudes (above 2500 meters) in the Indian Himalayas undergo menopause 1-1.5 years earlier than those living below 1000 meters. A study conducted more than two decades ago among urban Indian women by Sharma and Saxena (1981), showed only 10% affirmative response to direct questions regarding their menopausal problem, with most not agreeing to have menopausal problems even if they were suffering symptoms. This is primarily because these women are highly ignorant and ill-informed about the menopause and they are embarrassed to discuss such issues with their husbands or elderly ladies of the house who have already experienced it.

Bharadwaj et al., (1983) studied the age and symptomatology of menopause among low and high socio-economic groups. In this study they reported a combined mean average age at menopause of 45.03 years. They further showed that women of lower socio-economic strata had early age at menopause and had high parity as compared to women of higher socio-economic group who reached menopause later and had fewer children. However, they could not find any correlation between the age at menarche
and age at menopause. The difference in prevalence of menopausal symptoms between the two groups was attributed to the tendency of lower socio-economic group of women to ignore the symptoms as compared to the higher socio-economic group. There is evidence that menopause can have a positive meaning in terms of enhanced mobility, freedom from unwanted pregnancies and authority for women belonging to rural communities in India (Flint, 1975; George, 1996; Yahya and Rehan, 2003). Balgir (1985) reported a median age at menopause among the Skiligars of Punjab to be 43.71 years which is lowest among some other populations which he compared in his study.

Randhawa et al., (1987) reported mean age at menopause in the women of Himachal Pradesh to be 43.55 years. The study was conducted on 500 postmenopausal women, who represented general population residing in all the districts of the state. He observed that parity and place of residence had no effect on age at menopause. The women belonging to higher socio-economic groups, and those residing at lower altitudes had a later age at menopause than the women belonging to lower socio-economic groups, and those residing in higher altitudes.

Bhattacharya et al., (1991) reported mean age at menopause among Mahar women, a numerically dominant caste group of Maharashtra to be 43.03 ± 0.50 years. The age ranges from minimum of 37 to maximum of 47 years. Sethi et al., (1996) studied age at menopause among working and non-working Khatri women, and the median age was found to be 49.61 and 46.86 years, in the two groups, respectively. They (Sethi et al., 1996) further noted that there is a slight association of age at menopause with age at menarche, age at marriage and parity, however, the values were statistically non significant. On the other hand, age at menopause has been found to be independent of weight, height and educational status of the women.

Gupta and Aggarwal (2001) reported the perception of menopause and health complaints among women of three districts of Jammu and Kashmir (Kathua, Jammu and Udhampur). A majority of women reported hot flashes and night sweats as the most common symptoms. The study also indicated that majority
of the women felt the cessation of menstrual periods as ‘no change’ or as ‘a relief’.

Pradhan and Srivastava’s (2003) study was on the effectiveness of menopause on depression and insecurity in working and non-working women of Haridwar (Uttarakhand). A study on Saharia tribal women of Madhya Pradesh reported lower age at menopause, i.e., 44.6 ± 1.17. The lower age at menopause among these women may be possibly due to malnutrition, paucity of medical facility and harsh environment as reported by Kumar and Kapoor (2004).

The median age at menopause in educated women of Amritsar is 47.54 ± 2.31 years, and menopausal symptoms reported by these women are hot flashes and night sweats with higher percentages, followed by insomnia, headache, irritability, palpitation and nervous tension (Sidhu et al., 2005). The mean age at menopause among women in age range of 39 to 52 years of middle socio-economic group from Baroda city (Gujarat) is found to be 44.59 years. In this study, women having irregular periods with heavy menstrual flow perceived more of physiological difficulties during menopause. Women complained more of backache, loss of eyesight, pain in joints and fatigue during menopause than that of hot flashes and night sweats (Nagar and Dave, 2005).

The study by Sharma et al., (2005) on Brahmins and Rajput caste from rural areas of Jammu was on the rituals, taboos, social restrictions, health problems and nutrition, during the menopausal period. Majority of women belonging to both caste groups faced weakness during menopause. Brahmins have early age at menopause (47.90 ± .051 years) as compared to the Rajputs (48.02 ± .069 years). Profile of 152 postmenopausal women living in Raipur Rani Block of District Panchkula (Haryana) reported 44.1 years as average age at menopause. More than half of women suffer seven or more symptoms during menopause; diminished vision was reported as the most common problem.