

# Age at Menopause and Associated Bio-Social Factors of Health in Punjabi Women

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**Abstract:** The objectives of present study are to assess the average age at menopause, to evaluate the influence of certain bio-social factors on menopause, and to find the menopausal symptoms experienced by Punjabi women. A cross-sectional study was conducted on 564 Punjabi women of Chandigarh, ranging in age between 40-60 years. Out of these, 288 women who had attained natural menopause form the subject of present investigation. The mean age at natural menopause was found to be 47.91( $\pm$  3.16) years. The mean ages at menopause among early and late menopausal groups were 41.04 and 51.05 years, respectively. Statistically significant differences were found for height, weight, and parity, while BMI, body fat, blood pressure, age at marriage, and age at first child birth, failed to reveal significant differences between early and late menopausal groups. The menopausal symptoms, such as, hot flashes and irritability occurred with greatest frequency during as well as after menopause among women of the present study.

**Keywords:** Menopause, physical, physiological, social factors, symptoms.

## INTRODUCTION

In a woman's life there are two milestones, both related to menstruation and both to be considered as transition period. The first milestone is the start of menstruation around the 12<sup>th</sup> year. The event- *menarche*- marks the onset of the menstrual cycle. The second milestone is the cessation of menstruation around the 50<sup>th</sup> year. The event- *menopause*-marks the transition from the fertile years to a life phase characterized by a relative hormonal rest and stability, which shows a certain similarity with the life period preceding the first menstruation [1]. The word Menopause (*menopause*) was used for the first time in 1816 by French Physician *de Gardanne* [2]. Menopause is characterized endocrinologically by evidence of decreasing ovarian activity, biologically by decreasing fertility and clinically by alterations in menstrual cycle intervals. Natural menopause is recognized to have occurred after 12 consecutive months of amenorrhea, for which there is no other obvious pathological or physiological cause [3].

It is widely acknowledged that the end of menstruation is a complex biosocial process. The biology and evolution of menopause among women continue to present a fascinating challenge to biologists, anthropologists, and primatologists [4,5]. Reproductive senescence among women is universal. However, anthropological researches suggest [6-10] that menopause should not be conceptualized as an invariant biological transformation, and that it is more appropriate to think biology and culture as continuous feedback relationship of ongoing exchange, in which both are subject to variation.

A number of menopausal women are projected to increase rapidly from a total of 467 million to 1200 million by 2030 all around the world. The great majority of increase will occur in the developing countries. The rate of increase in the number of postmenopausal women is substantially faster in developing world than in industrialized world. Postmenopausal women will be increasing as a proportion of the total population from 9% in 1990 to 14% in 2030 [11]. A total of 130 million Indian women are expected to live beyond menopause into old age by 2015.

The age at which natural menopause occurs is between 45 and 55 years for women worldwide. In developed countries, the average age at menopause is about 51 years [12-15], whereas in countries like Philippines, Papua New Guinea, in various parts of Africa, India, Pakistan and Thailand, it is reported to be 45-50 years [16-23]. There has been a significant decline in the age at menarche over the past 100 years [24-26]. Similarly, a four year increase in the age at menopause over the past 100 years has been suggested [27, 28].

Identifying factors associated with the early and late menopause are important because age at menopause has been associated with risk of onset of several chronic diseases such as cardiovascular diseases, breast and endometrial cancers and osteoporosis [29-32]. There are various bio-social factors/variables which are believed to be associated with early and late age at menopause, like, body size and shape, blood pressure, age at menarche, socioeconomic status, age at first child birth, parity, income, education and dietary habits.

The pattern of constant change in variables such as body weight, [31, 33-36], body fat [37, 38], age at first child birth, and nulliparity/low parity [34, 36, 39] may be important in relation to the process of atresia. Several studies have fairly

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shown that lower socio-economic status is associated with early menopause in comparison to higher socio-economic status [12, 21, 28, 36, 39-43]. Lower educational attainment and non-employment of women play a significant role in early age at menopause [12, 44], and it is shown that working women experience delayed menopause than non working women [39, 43]. The difference in the age at menopause between working and nonworking women may also be attributed to better financial and living conditions of working women [43].

The association between age at menarche and age at menopause was not statistically significant [28, 45-47]. While some studies showed that age at menarche was significantly associated with age at menopause, with women reporting early age at menarche also having early age at menopause [48-51]. A direct effect (early menarche, early menopause or late menarche, late menopause) was also reported in Italy [52] and India [53]. A statistically significant inverse relationship between age at menarche and age at menopause (early menarche, late menopause) was described in Australia [54].

A consistent finding in the association of nulliparity/low parity (no. of children) with early age at menopause was found by many researchers [39, 55, 56,]. On the other hand, Jeune, [57] and Ayatollahi, [58] observed high parity among women reporting late age at menopause while other studies do not confirm such associations [18, 36, 59, 60]. In many studies lean, women appear to experience a natural menopause slightly earlier than heavier women [31, 55, 61, 62]. Some studies have also observed that women with lower BMI (Body Mass Index) had an earlier menopause [34, 59, 63, 64], whereas, no relation between BMI and age at menopause has been observed by [42, 60, 65]. Some studies have observed that relatively taller and heavier women experience menopause at a later age [31, 33-36].

The influence of menopausal age on arterial blood pressure is still unclear. In the previous reports on this issue available in the 'Medline database', systolic blood pressure levels have been found to show either, negative correlation [31, 66, 67], or positive correlation [68, 69] or no correlation [70-74] with age at menopause. Contrasting evidence has also been reported for diastolic blood pressure, which has been found to be either decreased [66] or increased [68-70] or unaffected [31, 67, 71, 72, 74, 75] due to early/late age at menopause.

Flint [6] was one of the first to carry out a community based investigation on menopause among Indian women, wherein she showed that menopause was experienced differently in India as compared to United States and there is a variation in age at menopause, and associated symptoms. 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 [76]. According to WHO [3], a variety of symptoms occurring either singly or together are frequently reported as being a part of menopausal symptoms. These include urinary problems, depression, nervous tension, palpitation, irritability, headache, sleeplessness, lack of energy, backache, and difficult in concentration. Hot flashes and night sweats are the symptoms

most consistently associated with menopause, although their prevalence varies in different cultures [10, 77-79].

Understanding the determinants of age at menopause is important, because an early menopause increases the length of women's exposure to risk factors for diseases related with decreased estrogen levels like, osteoporosis [80] and late menopause increases the risk of breast and endometrial cancers [81-83]. While very little research has been done on menopause in Indian context, there is a need to recognize menopause as an important issue in women's health care. The menopause is emerging as an issue owing to rapid globalization, urbanization, awareness and increased longevity in urban middle aged Indian women [84]. The present study was undertaken on Punjabi women of Chandigarh, (i) to determine the averages for age at menopause, and other physical, physiological and social variables, (ii) to find differences between women experiencing early and late menopause with regard to various physical, physiological and social variables, (iii) to report the occurrence of various symptoms experienced by women during and after menopause.

## MATERIAL AND METHODOLOGY

A cross-sectional study was conducted on 564 Punjabi women of Chandigarh, ranging in age between 40-60 years. The sample was selected through snow-ball sampling technique in which first contacts were made with two or three Punjabi women of above mentioned age group and then they were asked to identify other Punjabi women falling in the same age range. Only those women were considered whose parents and grandparents as well as her husband's parents and grandparents were Punjabi. All subjects of this study belong to middle socio-economic class. Out of the total of 564 women studied, 276 women were yet to experience menopause, while 288 women had attained menopause. The present study is confined to these 288 women who attained their menopause after 12 consecutive months of amenorrhea, for which there is no other pathological or physiological cause [3].

Each subject was studied for the following physical, physiological, and social variables:

### Decimal Age

The decimal age (in years) of each individual was calculated as the difference between date of investigation and date of birth, using decimal age calendar [24].

### Physical Variables

Following standard techniques [85], each subject has been measured for height (Instrument used - Anthropometric rod), weight and body fat (Instrument used - Omron Karda Scan Fat Analyzer Scale), and Body Mass Index (BMI) has been derived using the formula – weight (kg)/ height<sup>2</sup> (meter).

### Physiological Variables

#### Blood Pressure

Blood pressure has been measured with 'Omron Automatic Blood pressure Monitor MX3' using standard technique.

Age at Menarche

The data on age at menarche were obtained using retrospective (or recall) method. Although this method is subject to some degree of inaccuracy [86], yet this is the only way to obtain information on an event which has not happened in the recent past.

Age at Menopause

The data on age at menopause was taken from subjects by asking them to recall their age at the time of last menstrual period [86, 87]. In our sample, almost all the women could remember the month and year correctly of the first menstrual period (menarche) and last menstrual period (menopause). The middle (15<sup>th</sup>) of the month was taken for calculating age at menopause.

Social VariablesAge at Marriage

The age at marriage of each individual was calculated by subtracting the date of birth from the date of marriage.

Age at First Child Birth

Age of women at first child birth was also calculated.

Parity

For each woman number of live births was recorded.

Socio- Economic StatusEducationDietary HabitsSymptoms

In depth interview based on structured schedule was conducted for collecting information on symptoms of menopause experienced by each subject, as well as women's perception regarding the effect of menopause on their health.

**Statistical Analysis:** Mean, standard deviation and frequencies were calculated and data were analyzed using Chi-square and Student's t-test methods.

**Early and Late Menopause:** Using decimal age at menopause, the data of 288 women was arranged in ascending order. The women who were below 10<sup>th</sup> percentile were labeled as having 'early' menopause and women above 90<sup>th</sup> percentile were labeled as having 'late' menopause.

**RESULT AND DISCUSSION**

Table 1 presents Mean ( $\pm$ SD) for decimal age and various physical, physiological and social variables considered in the present study among 288 Punjabi women who had attained menopause. As mentioned earlier, the studied women ranged in age between 40-60 years, and mean decimal age of these women was found to be 53.19 years. The averages for each variable considered in the present sample and their comparison with similar recent national and international studies is presented as follows. Before discussing the results of other variables, it may be appropriate to present

**Table 1. Mean ( $\pm$  SD) Values for Different Variables in Menopausal Women (N=288)**

Variables	MEAN $\pm$ S.D.
Decimal Age (yrs)	53.91 $\pm$ 3.60
<b>Physical Variables</b>	
Height (cms)	155.03 $\pm$ 5.52
Weight (Kg)	69.64 $\pm$ 10.41
Body Fat (%)	39.06 $\pm$ 3.72
Body Mass index (BMI)	28.98 $\pm$ 4.45
<b>Physiological Variables</b>	
Blood Pressure (mmHg) Systolic	131.29 $\pm$ 16.30
Diastolic	82.60 $\pm$ 9.65
Age at Menarche (yrs)	14.20 $\pm$ 1.46
Age at menopause (yrs)	47.91 $\pm$ 3.16
Age at Menopause (yrs) in Working Women (N=131)	47.65 $\pm$ 3.77
Age at Menopause (yrs) in Non-Working Women (N=157)	48.12 $\pm$ 2.85
<b>Social Variables</b>	
Age at Marriage (yrs)	23.84 $\pm$ 3.17
Age at first child Birth (yrs)	25.96 $\pm$ 3.42
Parity (total no. of Children) (yrs)	2.28 $\pm$ 0.78

the results on average age at menopause among Punjabi women of Chandigarh.

### Age at Menopause (Table 1)

Considering the total sample of 288 women, the individual age at menopause varied from a lowest of 37.48 years to highest of 53.59 years, with a mean age at menopause being 47.91 years ( $\pm 3.16$ ). This mean age at menopause of present sample is higher than those reported for rural women of North India (44.10 yrs) [88], Baroda females (44.59 yrs) [89], Bazzigar women of Punjab (46.98 yrs) [90], but comparable to Amritsar women (47.54 yrs) [91]. While comparing certain international studies it was found that average age at menopause of present sample was almost similar to those [23] for Pakistani women (47.53 yrs) and for Turkish women (47.42 yrs) [60]. Women from Papua New Guinea with 44.00 yrs [45] and Thai women with 47.00 yrs [16] had lower mean age at menopause, while South African women with 48.90 yrs [92], Japanese women with 49.33 yrs [13], Iranian women with 49.60 yrs [15], Australian women with 50.20 yrs [14], American women with 50.9 yrs [93] and women from Finland with 51.00 yrs [12] had higher mean age at menopause than Punjabi women of present study.

Out of the total sample of 288 women of our study, 131 were working and 157 were non-working (housewives) women. The data were segregated accordingly and mean age at menopause was calculated, and it was found that working women had relatively earlier menopause at an average age of 47.65 years as compared to non-working women whose average age was 48.12 years (Table 1). However, this difference in mean age at menopause was found to be statistically non-significant ( $t=1.121$ ). This result of our study is contradictory to that reported by Sethi *et al.* [43] who observed early menopause in non-working women (45.25 yrs) and late menopause in working women (46.36 yrs), but is an agreement with the study of Hidayet *et al.* [47], i.e., working women having early menopause (46.52 yrs) and non-working women having late menopause (47.86 yrs).

### Physical Variables

#### Height

The Punjabi women of Chandigarh were taller (155.03 cm) than north Indian women (152 cm) [94] and Thai women (154.5 cm) [45], but shorter than women of California State (159.6 cm) [95].

#### Weight

Again Punjabi women of present study were heavier with 69.64 kg mean weight in comparison to the mean weight of 54.8 kg among North Indian women [94], 58.1 kg of Thai women [45], 57.4 kg in women of California State [95]. However, the women of present study are much lighter than Alexandria (Egypt) women having 81.39 kg mean weight [47].

#### Body Fat

Mean Body fat in Punjabi women of present study was 39.06 percent, which is much higher than among California women (32.8 percent) [95].

### Body Mass Index (BMI)

Following WHO [96] classification, Punjabi women of present study with mean BMI value of 28.98 were classified as being overweight. The BMI values for certain other populations as reported in literature are lower than that observed in our sample, for example, 23.7 among North Indian women [94], 27.3 among American women [97], 25.2 in Italian women [98] and 24.7 in California State women [95].

### Physiological Variables

#### Age at Menarche

Women of present study revealed 14.20 years ( $\pm 1.46$ ) as mean age at menarche, which lies closer to 14.50 yrs among North Indian women [94], lower than Thai women 15.60 yrs [45], but higher than those observed among women from California (13.0 yrs), Alexandria (12.24 yrs), and Morocco (11.0 yrs) [47, 48, 95].

#### Blood Pressure

The mean systolic/diastolic blood pressure values of women of present study are 131.29/ 82.60 mmHg. The mean blood pressure was 136.9/83.2 among Italian women [97], 133/84 among Swedish women [31] and 113/74 among American women [99].

### Social Variables

#### Age at Marriage

The mean age at marriage among Punjabi women of present study was found to be 23.84 ( $\pm 3.17$ ) years.

#### Age at First Child Birth

The mean age of women at birth of first child in the present study has been observed to be 25.96 years, which is lower than that among California women (28.2 years) [95].

#### Parity

The average number of children per women in the present study was 2.28 as compared to 4.3 in Thai women [45].

### Early and Late Menopause

A perusal of published literature on age at menopause showed some studies segregated their sample into early and late menopausal groups and then analyzed the data on different variables. Unfortunately, most of these studies are silent on the criterion that has been used to divide the sample in early and late menopausal groups. However, as mentioned earlier, in the present study, using decimal age at menopause, the data on 288 women was arranged in ascending order. Women who were below 10<sup>th</sup> percentile were labeled as having 'early' menopause and women above 90<sup>th</sup> percentile were labeled as having 'late' menopause.

Table 2 presents the averages for different Physical, Physiological and Social variables among the women having early menopause and late menopause. In order to find differences, if any, in the two menopausal groups, 'student's t-test' of significance was applied, and the t-values for different variables are listed in last column of Table 2.

### Age at Menopause

The mean decimal age of women falling under early and late menopausal groups was 50.96 and 55.99 years, respec-

tively. Statistically, highly significant difference ( $t=35.34$ ) was observed for mean age at menopause between 'early' menopausal group (41.04 yrs) and 'late' menopausal group (53.05 yrs).

### Physical Variables

It is clear from the values presented in Table 2 that women having late menopause were significantly taller as well as heavier than women who experienced early menopause. However, surprisingly, Body Mass Index (BMI) failed to reveal significant difference between the two groups, though women having late menopause showed slightly higher mean BMI values. On the other hand, per-

centage of body fat was also relatively higher in late menopausal group with t-value approaching significance level. Similar results for height, weight and BMI have been reported from Punjab [43], France [100], and Italy [52], while comparing early and late menopausal groups. Gold [44] and Ozdemir and Col [60], presented data on American and Turkish women, respectively and did not find any difference among early and late menopausal groups with regard to above physical variables.

### Physiological Variables

Though mean values for age at menarche and systolic blood pressure are higher and that of diastolic blood pressure

**Table 2. Comparison of Mean ( $\pm$  SD) Values for Different Variables Between Early and Late Menopausal Women**

Variables	Early (N=29)	Late (N=29)	t-Values
Decimal age (yrs)	50.96 $\pm$ 4.49	55.99 $\pm$ 1.61	-5.58
<b>Physical variables</b>			
Height (cms)	153.44 $\pm$ 5.39	157.88 $\pm$ 6.54	-2.77*
Weight (kg)	66.91 $\pm$ 12.03	72.82 $\pm$ 7.92	-2.17*
Body Fat (%)	37.97 $\pm$ 3.68	39.53 $\pm$ 2.74	-1.79
Body Mass index (BMI)	28.61 $\pm$ 4.81	29.01 $\pm$ 3.21	-0.36
<b>Physiological variables</b>			
Blood Pressure (mmHg) Systolic	129.65 $\pm$ 13.79	135.55 $\pm$ 18.20	-1.36
Diastolic	84.17 $\pm$ 9.68	81.38 $\pm$ 8.91	+1.124
Age at Menarche (yrs)	13.89 $\pm$ 1.62	14.15 $\pm$ 1.59	-0.589
Age at menopause (yrs)	41.04 $\pm$ 1.61	53.05 $\pm$ 0.83	-35.34**
<b>Social variables</b>			
Age at Marriage (yrs)	23.36 $\pm$ 2.79	23.46 $\pm$ 3.10	-0.13
Age at first child Birth (yrs)	25.80 $\pm$ 3.77	25.29 $\pm$ 2.76	+0.57
Parity (total no. of Children) (yrs)	2.00 $\pm$ 0.67	2.38 $\pm$ 0.73	-2.04*

\* Significant at 5 percent

\*\* Significant at 1 percent.

**Table 3. Comparison of Frequency and Percentage of Education, Income and Dietary Habits among Early and Late Menopausal Women**

Variables	Early (N=29)	Late (N=29)
<b>Education</b>		
Higher Secondary Education	7 (24.13)	10 (34.48)
Above Higher Secondary	22 (75.86)	19 (65.52)
<b>Income</b>		
Below 20,000 Rs/ month	5 (17.24)	7 (24.14)
Above 20,000 Rs/ month	24 (82.75)	22 (75.86)
<b>Dietary habits</b>		
Vegetarian	22 (75.86)	19 (65.52)
Non-vegetarian	7 (24.13)	10 (34.48)

was lower for the late menopausal group as compared to the early menopausal group, they failed to reveal any statistically significant differences. Yet, it may be said that women having early menopause had early menarche and lower systolic blood pressure. Similar observations have been made by other workers [31, 43, 48, 52, 53, 101] in their respective studies.

#### Social Variables

Mean age at marriage as well as mean age at first child birth were found to be similar in both, early and late menopausal groups. Parity (total no. of children per woman) showed statistically significant difference between early and late menopausal groups, i.e., low parity in early menopausal group and high parity in late menopausal group. Our results on parity are in consonance with those presented by others [12, 36, 43, 45, 57, 82]. Table 3 lists the frequency and percentage of education, income and dietary habit among early

and late menopausal groups. It is clear from the data presented in the table that all the three variables do not seem to influence the occurrence of early or late menopause in women of present study, as observed by other researchers [12, 42-44].

#### Menopausal Symptoms

Table 4 gives overall prevalence of common symptoms experienced by 288 women either during menopause or after menopause. These symptoms may occur either singly or together and are reported as menopausal symptoms by the women, though only a few symptoms may be specific to menopause (such as, hot flashes, night sweats, urinary problems) while others may be called as somatic (such as, joint pain, bodyaches, swollen feet and hands) and psychological symptoms (such as, irritability, depression, anger). In the present study 43.41% (during menopause) and 45.83% (after menopause) women reported suffering from one or more

**Table 4. Prevalence of Symptoms During and After Menopause**

	During Menopause	After Menopause
Symptoms experienced	N (%)	N (%)
Yes	125 (43.41)	132 (45.83)
No	163 (56.59)	156 (54.16)
Hot flashes	79 (63.20)	67 (50.75)
Irritability	65 (52.0)	41 (31.06)
Anger/ loose temper	23 (18.40)	10 (7.57)
Body ache and backache	20 (16.0)	16 (12.12)
Sleeplessness	14 (11.20)	12 (9.09)
Night Sweats	11 (8.80)	12 (9.09)
Depression	9 (7.20)	7 (5.30)
Fatigue/Laziness/ tiredness	8 (6.40)	17 (12.87)
Swollen feet and hands	7 (5.60)	9 (6.81)
Mood change	7 (5.60)	8 (6.06)
Dizziness	6 (4.80)	2 (1.51)
Urinary Problems	6 (4.80)	4 (3.03)
Heat from hands and feet	6 (4.80)	6 (4.45)
Joint Pains	4 (3.20)	23 (17.42)
Shortness of breath	4 (3.20)	7 (5.30)
Numbness	3 (2.40)	4 (3.03)
Skin Problem	3 (2.40)	4 (3.03)
Lack of Sexual desire	3 (2.40)	11 (8.33)
Palpitation	3 (2.40)	2 (1.51)
Lack of Concentration/Memory loss	3 (2.40)	12 (9.09)
vaginal Dryness/ Itching	2 (1.60)	13 (9.84)

**Table 5. Affect of Menopause on Health**

Affect on Health	N (%)
Yes	129 (44.79)
No	159 (55.21)
Problems	N (%)
Heaviness in body/Increase in body weight	54 (41.86)
Diminished eyesight	51 (39.53)
Weakness/ Lethargic	16 (11.63)
Hypertension	12 (9.30)
Joint pains/ Arthritis	10 (7.75)
Diabetic	7 (5.43)
Skin Problems	3 (2.32)
Breathlessness/ asthmatic	2 (1.55)

symptoms. The symptoms listed in Table 4 are arranged in descending order of occurrence under the column 'during menopause'. It is clear that 'hot flashes' (which is a Vasomotor symptom of menopause) followed by irritability (psychological symptom) occurred with greatest frequency during as well as after menopause. It is interesting to know that while only 3.20% women reported joint pains during menopause and 17.42% women reported joint pains after menopause. Other commonly occurring symptoms during menopause are anger, bodyaches, and sleeplessness; and after menopause frequently reported symptoms are joint pains, fatigues and body aches. According to WHO [3], hot flashes and night sweats are the symptoms most consistently associated with menopause, although their prevalence varies in different cultures. The combined prevalence of hot flashes and night sweats has been reported to be 23% in Thai women [45], 32% in Pakistani women [102], 45% in North America women [17] and United Arab Emirates women [103], 73.90% in Dutch women [104] and Turkish women [65]. In our sample also we found the highest prevalence of hot flashes.

Each woman in the present study was asked whether menopause has in any way affected their health (Table 5). About 45% women felt that they were facing health problems due to menopause. Most frequently reported health problems by these women were heaviness in body/ increase in body weight (41.86%), followed by diminished eyesight (39.53%). Diminished vision has also been reported among menopausal women in rural North India [87].

After interviewing all the women it was found that the majority of women suffering from one or more symptoms neither consulted any doctor nor adopted any home remedy. Most of these women felt that occurrence of such symptoms is a part of the physiological process of menopause. Some women who sought any medical help for cure of the symptoms reported that the doctors advised them to take calcium and iron supplements. Most women of the present study wel-

comed the cessation of menstrual period, as it liberated them from the unnecessary botheration.

## CONCLUSION

Menopausal health demands priority in Indian scenario due to increase in life expectancy and growing population of menopausal women. Large efforts are required to educate and make these women aware of menopausal symptoms, reduction of discomfort and enable them to seek appropriate medical care if necessary. Moreover, understanding and beliefs about menopause may also be due to differences in health education between countries. Nevertheless, as cross-sectional and anthropological studies have suggested, it seems that Asian women are more likely to have a more positive view of menopause, while western women are more concerned about ageing, and view menopause as a problem to be controlled [6, 102, 105].

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