Are Alcohol Consumption and Smoking Associated with the Risk of Early Menopause? Evidence from the NFHS-5 (2019-20) Survey in India

Introduction

Early natural menopause, defined as menopause occurring in women under 45 years of age without medical intervention, affects approximately one in ten women. Early menopause can lead to various long-term health issues, including osteoporosis, cardiovascular diseases, and cognitive decline. Women experiencing early menopause may face significant physical and psychological challenges, including sexual dysfunction. Early menopause can also affect a woman's ability to conceive in the current scenario when late marriages and childbirth are increasing. Thus, understanding the risk factors can help identify those at higher risk and implement preventive measures. The objective of this study is to explore the relationship between alcohol consumption and smoking as potential risk factors contributing to early menopause in India.

Data & Methodology

This analysis draws on cross-sectional data from the National Family Health Survey (NFHS-5) conducted by the International Institute for Population Sciences (IIPS) in 2019-2020. The study focuses on early menopause as a dependent variable, defined by the absence of menstruation for six months among married women aged 30-45, excluding pregnant women and those experiencing postpartum amenorrhea. The sample includes 301,252 women.

Bivariate and multivariate analyses were conducted to examine the relationship between early menopause and various socioeconomic, demographic, and health factors. Logistic regression was used to assess significant effects, while Cox proportional hazards models were employed to estimate the median age of menopause onset, excluding women with hysterectomies. Hazard ratios (HRs) were calculated for key variables.

Outcome Variable

Early menopause is considered as the dependent variable. It is defined as the absence of menstruation for six months preceding the survey among married women in the reproductive age group of 30 to 45 years. Pregnant women and women in the postpartum amenorrhea period were not considered for the study.

Selection of explanatory variables

The major explanatory variables considered for this study are alcohol consumption and smoking. The other covariates for this analysis were based on existing associations with age at menopause from the literature, as per available in the NFHS-5. The covariates included in the analysis were broadly grouped as socio-economic variables: educational attainment of women, wealth index quintiles (based on the ownership of household assets), type of residence (rural/ urban), Working status of women (Working/Not working). Family planning variables were the use of female sterilisation. Demographic variables included marital status and parity. Anthropometric variables included BMI and Anaemia.

Results

Early menopause was reported by 11% of women under 45 in India.

Regional differences:

The data on early menopause experience across various states in India (Table 1) reveals notable regional variations. The national average indicates that 10.65% of women have experienced early menopause. The highest proportion of women experiencing early menopause is seen in Bihar, where 18.13% of women reported early menopause. Close to Bihar, Telangana has 18.2% of women reporting early menopause. Similarly, 17.7% of women in Andhra Pradesh have experienced early menopause.

Most of the northeastern states, including Manipur, Mizoram, and Nagaland, have lower incidences of early menopause. The northeastern states generally show a lower incidence of early menopause, with states like Manipur (4.75%), Mizoram (4.71%), and Meghalaya (5.07%) having some of the lowest percentages. Nagaland is slightly higher at 5.56%, but still below the national average. States such as Kerala, Puducherry, and Andaman & Nicobar Islands report lower percentages of women who have experienced early menopause, with figures below 5%.

Alcohol & Smoking as the major risk factor

The prevalence of early menopause was significantly higher among women who reported consuming alcohol. Specifically, 15.08% of women who consumed alcohol experienced early menopause compared to 10.6% of women who did not consume alcohol. Furthermore, the frequency of alcohol consumption also played a role. Among women who consumed alcohol almost every day, 18.7% experienced early menopause, while 14.7% of those who consumed alcohol once a week and 13.8% of those who consumed alcohol less than once a week reported early menopause. Tobacco consumption was strongly associated with early menopause. Among women who smoked, 17.52% experienced early menopause, a notably higher proportion compared to 10.63% among non-smokers.

Anaemia, BMI and early menopause

Women with underweight status exhibited a slightly higher incidence of early menopause (12.38%) compared to those with normal BMI (10.25%). Women who were overweight (10.83%) and obese (11.27%) also showed a somewhat elevated likelihood of experiencing early menopause compared to women with normal BMI. Interestingly, anaemia seemed to have an inverse relationship with early menopause. Among anaemic women, 9.64% reported early menopause, whereas a higher proportion (11.98%) of non-anaemic women experienced early menopause.

Demographic, Socio-economic Factors

Early menopause prevalence decreased as wealth increased. Among women in the poorest quintile, 12.19% experienced early menopause, while this percentage dropped to 6.88% in the richest quintile. This suggests a strong socioeconomic gradient, with wealthier women less likely to experience early menopause. Urban-rural disparities were evident, with women residing in rural areas more likely to experience early menopause (12.03%) compared to their urban counterparts (8.02%). Widowed women had the highest proportion of early menopause,

with 18.96% reporting this condition, followed by divorced women (11.73%) and those no longer living with their partners (11.26%). Married women had a lower prevalence of early menopause (10.29%), while women who were never in union had the lowest proportion (6.54%). Educational attainment was inversely related to early menopause. Women with no education had the highest prevalence of early menopause (16.47%), while those with higher education experienced significantly lower rates (3.23%). This demonstrates a clear link between higher education levels and reduced likelihood of early menopause. Parity was found to be inversely associated with early menopause. Women with four or more children had the highest prevalence (14.71%), while those with one child had the lowest (7.85%). Women with no children reported a 9.98% prevalence of early menopause, indicating that higher parity may increase the likelihood of early menopause.

Table 1: State wise prevalence of early menopause among women age 30-45, NFHS 5 (2019-20)

State	Experienced Early menopause		
	No	Yes	Total (N)
Jammu & Kashmir	90.96	9.04	2,711
Himachal Pradesh	94.67	5.33	1,888
Punjab	92.2	7.8	7,284
Chandigarh	94.77	5.23	294
Uttarakhand	91.91	8.09	2,525
Haryana	92.89	7.11	6,142
Nct Of Delhi	92.78	7.22	4,777
Rajasthan	93.13	6.87	16,858
Uttar Pradesh	88.69	11.31	45,205
Bihar	81.87	18.13	22,816
Sikkim	93.93	6.07	167
Arunachal Pradesh	92.1	7.9	257
Nagaland	94.44	5.56	312
Manipur	95.25	4.75	595
Mizoram	95.29	4.71	281
Tripura	92.77	7.23	1,018
Meghalaya	94.93	5.07	720
Assam	89.4	10.6	8,077
West Bengal	90.37	9.63	24,858
Jharkhand	89.55	10.45	7,331
Odisha	90.22	9.78	10,650
Chhattisgarh	90.76	9.24	7,170
Madhya Pradesh	90.04	9.96	17,180
Gujarat	88.93	11.07	14,887
Dadra & Nagar Haveli	94.36	5.64	116
Maharashtra	91.03	8.97	30,346
Andhra Pradesh	82.3	17.7	13,442
Karnataka	86.82	13.18	17,226
Goa	94.66	5.34	494
Lakshadweep	97.7	2.3	21
Kerala	95.85	4.15	8,819
Tamil Nadu	93.19	6.81	20,481
Puducherry	95.53	4.47	336
Andaman & Nicobar Isl	96.15	3.85	98
Telangana	81.8	18.2	8,818
Ladakh	90.88	9.12	51
India	**89.35**	**10.65**	3,04,252

Table 2: The association between Alcohol, smoking and other risk factors behind the early menopause of women aged 30-45 in India, NFHS 5-2019-20

	Experienced Menopause			
Covariates	**No (%)**	**Yes (%)**	**Total Women (N)**	**Chi2 Significance value**
Alcohol				Pearson chi2(1) = 33.8370 Pr = 0.000
No	89.4	10.6	3,01,150	
Yes	84.92	15.08	3,102	
Frequency of Alcohol consumption				Pearson chi2(2) = 44.3253 Pr = 0.000
almost every day	81.3	18.7	604	
about once a week	85.3	14.7	1,198	
less than once a week	86.2	13.8	1,300	
Smokes tobacco				Pearson chi2(1) = 41.0647 Pr = 0.000
Non Smoker	89.37	10.63	3,03,376	
Smoker	82.48	17.52	876	
Anemia				Pearson chi2(1) = 253.8031 Pr = 0.000
No	88.02	11.98	1,24,897	
Yes	90.36	9.64	1,62,199	
BMI				Pearson chi2(3) = 152.8033 Pr = 0.000
Normal	89.75	10.25	1,62,896	
Underweight	87.62	12.38	31,038	
Overweight	89.17	10.83	70,752	
Obese	88.73	11.27	27,153	
Wealth quintile				Pearson chi2(4) = 771.6286 Pr = 0.000
poorest	87.81	12.19	54,965	
poorer	87.17	12.83	58,051	
middle	88.11	11.89	61,695	
richer	90	10	64,038	
richest	93.12	6.88	65,500	
Place of residence				Pearson chi2(1) = 447.2335 Pr = 0.000
urban	91.98	8.02	1,04,879	
rural	87.97	12.03	1,99,372	
Marital Status				Pearson chi2(4) = 1.2e+03 Pr = 0.000
never in union [incl	93.46	6.54	5,380	
married	89.71	10.29	2,79,714	
widowed	81.04	18.96	14,337	
divorced	88.27	11.73	1,366	
no longer living toge	88.74	11.26	3,453	
Education Status				Pearson chi2(3) = 5.8e+03 Pr = 0.000
No education	83.53	16.47	1,00,437	
primary	88.49	11.51	45,968	
secondary	92.31	7.69	1,22,538	
higher	96.77	3.23	35,307	
Female Sterilisation done				Pearson chi2(1) = 12.0160 Pr = 0.001
no	89.27	10.73	1,55,388	
yes	89.31	10.69	1,43,970	
Parity				Pearson chi2(4) = 1.4e+03 Pr = 0.000
No child	90.02	9.98	15,238	
One child	92.15	7.85	35,585	
Two children	91.39	8.61	1,16,107	
Three children	88.23	11.77	71,876	
4+ children	85.29	14.71	65,444	