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Original article

# Impact of parity and breast-feeding duration on body mass index among post-menopausal women

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ABSTRACT

*Background:* Parity is positively associated with body size and other weight related conditions. Predominant breastfeeding has a positive impact on the body mass index during post menopause.
*Aims and objectives:* To study the influence of parity and breastfeeding practices on body mass index (BMI) among post-menopausal women.
*Method:* A community-based study was carried out for 6 months. Total of 140 post-menopausal women from Udupi and Manipal areas in Karnataka were selected. Their anthropometric measurements (height and weight) were taken to derive the body mass index. Gynaecological (menarche age, parity), medical history, breastfeeding practices, personal habits were recorded using a structured questionnaire. Regression and correlation were used as applicable for data analysis using SPSS v16.
*Results:* There were 58.7% of post-menopausal women in the normal BMI class, 29% and 12.3% in grade I and II obese classes. A statistically significant ($p < 0.01$) negative correlation was observed between body mass index (BMI) and breastfeeding duration. Parity was positively correlated to body mass index ($p < 0.01$). Majority of the subjects 78.6% had breastfed for more than 12 months.
*Conclusions:* The influence of child bearing practices such as parity, breastfeeding duration on body mass index was significant. With increasing parity and decrease in breastfeeding duration post-menopausal women were at an increased risk of being obese.

## 1. Introduction

Menopause occurs with the final menstrual period, which can be confirmed in retrospect.[1] About 43 million post-menopausal women live in India and it is projected to be 103 million by 2026.[2] The changes in the hormones and cessation of ovarian functions alter the distribution of fat in the body, leading towards accumulation of abdominal fat causing post-menopausal women to be obese.[3,4] Multiparity is considered to be a risk factor for the development of obesity[5] but this is not extensively studied among Indian population. Parity shows a positive association with increased body mass index among women in developed countries.[6–8] Effects of breastfeeding on the body mass index have also been studied.[9–12] The relationship between parity, breastfeeding practices and its effect on body mass index among post-menopausal has also been investigated by[10,11,13] and the possible reduction in body mass index associated with increased duration breastfeeding and the increase of body mass index with multi parity is reported. Importance has been given to the under-nutrition phenomena in the developing countries where now obesity is rising, imposing the need to undertake studies on obesity in different groups. Reproduction in retrospect is considered as an important factor of weight gain during post-menopausal phase.

## 2. Aims and objectives

This study has attempted to estimate the change in body mass index that could be attributed to parity and breastfeeding duration during the reproduction phase among the post-menopausal women.

## 3. Materials and methods

Study design: A descriptive study. Study area; Udupi and Manipal areas of the state of Karnataka. Study duration; The study was carried out between July to December 2013. Sample size and estimation; snowballing technique, and the sample size was calculated as 140 considering the prevalence of postmenopausal women as 27% and 95% confidence level and 5% margin of error. Study population; 140 post-menopausal women between 40 and 70 years of age. Inclusion criteria;

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Age > 40 years, women who had their last menstrual period before 12 months, post-menopausal women who has delivered a child beyond 24 weeks of gestation. Exclusion criteria; Nullipara women, peri-menopausal women, subjects were randomly selected from the community.

Ethical approval; The medical ethics committee of the Kasturba Hospital approved this study and each study participant signed a written consent form.

Data collection; Data on socio economic status and demographic details were collected using a structured questionnaire. Anthropometric measurements collected were height and weight to derive the body mass index. Body weight was recorded using a calibrated digital weight scale (Salter, Germany) to the nearest 0.1 kg. Subjects were asked to wear light-weight clothing and without footwear. Height was measured to the nearest 0.1 cm using a mobile stadiometer (Seca 213, USA). BMI was calculated as Weight (kg)/Height ($m^2$) and was interpreted according to World Health Organization (2012) recommendations. Parity was self-reported, and it was the total number of live births.

Data analysis; Statistical analyses were performed using statistical package for social sciences (SPSS) version 16 for Windows (SPSS Inc., Chicago, IL). Descriptive data were presented as percentages and frequencies for categorical variables and mean and standard deviation was used for continuous variables to interpret data. Regression analysis and correlation was performed for the comparison and association between parity breastfeeding practices and the body mass index.

## 4. Results

The main characteristics of the subjects grouped according to parity are shown in Table 1. There were differences among the post-menopausal women in the age at menopause, body mass index, weight and breastfeeding duration when grouped according to parity. Post-menopausal women with parity more than 6 had increased weight, body mass index and decreased breastfeeding duration. Women were between 40 and 70 years of age. There were 30.15% women in the 51–60 year age category, 44.6% were married, 36.9% were school educated and 36.5% were married. The mean age at menopause among the post-menopausal women was 49.9 ± 3.9. The anthropometric measurements taken are given in Table 2. The mean weight 60.6 ± 9.50 Kg and body mass index is 24.59 ± 3.7Kg/m2 among the post-menopausal women. According to body mass index 57.9% women belonged to the normal body mass index category. Table 3 shows the parity and breastfeeding practices followed by the post-menopausal women. Mean parity is 2 and maximum parity was 7. Majority of the women (97.9%) had breastfed for more than 6 months. Table 4 shows the correlation between body mass index with parity and breastfeeding duration. Significant positive correlations ($p < 0.01$) were observed between parity and breastfeeding duration with body mass index. Table 5 depicts the odds of breastfeeding duration being a an independent predictor of body mass index was (OR 16.4, 95% CI:0.8–0.9) and was statistically significant at (p 0.0001) but the odds of parity being a predictor of body mass index was more higher than breastfeeding duration, menarche age and age at menopause (OR 20, 95% CI:2.3–8.4) and was statistically significant at (p 0.0001). In this logistic regression analysis, body mass index was the dependent variable and age at menarche, parity, breastfeeding duration, age at menopause were the dependent variables.

**Table 1**
General characteristics of the subjects grouped according to parity.

| Characteristics | Parity | | | |
|---|---|---|---|---|
| | 1–2 | 3–4 | 5–6 | > 7 |
| Age (years) | 56 (44–68) | 55 (45–68) | 62 (57–65) | 68 (66–69) |
| Age at menopause (years) | 49 (41–55) | 50 (43–55) | 53 (51–55) | 52 (51–54) |
| Body mass index ($Kg/m^2$) | 24.6 (16–31.5) | 24.2 (15–32.4) | 24.3 (18–35.1) | 30.0 (24–34.6) |
| Weight (Kg) | 61.3 (36–79) | 59.8 (35–77) | 56.5 (42–79) | 64.6 (49–80) |
| Height (m) | 1.58 (1.31–1.74) | 1.58 (1.41–1.79) | 1.54 (1.41–1.79) | 1.46 (1.41–1.52) |
| Breastfeeding duration (months) | 18 (2–37) | 19 (2–48) | 28 (24–36) | 20 (12–24) |

**Table 2**
Anthropometric measurements among the study group.

| | Parameter | Frequency | Percentage |
|---|---|---|---|
| Body mass index ($Kg/m^2$) | Underweight | 7 | 5 |
| | Normal | 70 | 50 |
| | Overweight | 42 | 30 |
| | Grade I obesity | 16 | 11 |
| | Grade II obesity | 5 | 4 |

**Table 3**
Parity and Breastfeeding practices among the study group.

| | Parameter | Frequency | Percentage |
|---|---|---|---|
| Breastfeeding duration (months) | 3–6 months | 3 | 2.1 |
| | 6–12 months | 27 | 19.3 |
| | > 12 months | 110 | 78.6 |
| Parity | 1 | 21 | 15.0 |
| | 2 | 55 | 39.3 |
| | 3 | 45 | 32.1 |
| | 4 | 10 | 7.1 |
| | 5 | 4 | 2.9 |
| | 6 | 2 | 1.4 |
| | 7 | 3 | 2.1 |

**Table 4**
Correlation between body mass index, parity and breast-feeding duration.

| | Parity | |
|---|---|---|
| | R value | P value |
| Body mass index ($Kg/m^2$) | 0.375[a] | 0.000 |
| | Breastfeeding duration | |
| | R value | P value |
| Body mass index ($Kg/m^2$) | −0.298[a] | 0.000 |

[a] Indicate significance at 0.01.

**Table 5**
Independent predictors of body mass index.

| Predictor | P value | OR | 95% confidence interval | |
|---|---|---|---|---|
| | | | Lower | Upper |
| Age (years) | 0.157[NS] | 1.9 | 0.868 | 1.023 |
| Parity | 0.000[a] | 20 | 2.298 | 8.417 |
| Breast feeding duration (months) | 0.000[a] | 16.4 | 0.867 | 0.951 |
| Menarche age (years) | 0.28[NS] | 1.15 | 0.669 | 1.124 |
| Age at menopause (years) | 0.224[NS] | 1.48 | 0.797 | 1.055 |

[a] Indicates significance at 0.01 NS- not significant.

## 5. Discussion

The current study found a linear positive correlation between multi parity and increased body mass index among post-menopausal women in Udupi and Manipal areas in the state of Karnataka. We also observed a negative correlation between breastfeeding duration and body mass index, even though the sensitivity of the correlation was low it gives

good perspective for future research in this area as breastfeeding and parity has an impact on the postmenopausal women's body mass index. Breastfeeding frequency and duration in this cohort is consistent with findings by Gajalakshmi et al. among post-menopausal women.[13] With increasing breast-feeding duration, the body mass index decreased among the post-menopausal women, similar findings were also observed by.[10,17,18] Wiklund et al.[9] reported that short duration of breastfeeding results in fat mass accumulation in later life among Finnish women, whereas conflicting ideas to the study were reported by.[19,20] During the phase of menopause women tend to have shift in their body composition towards central obesity, which may be altered by breastfeeding duration during reproduction phase which in turn alters the fat distribution. The prevalence of normal body mass index among post-menopausal women was 57.9% while 30% and 12% were falling in the obese I and II classes respectively. Similar findings were reported by[14–16]

An increase in the mean weight, body mass index was also observed with multi parity could be explained by the cumulative accumulation of weight during successive pregnancies. Sichieri et al.[21] reported that parity is associated with increased body mass index among rural Iraqi women which was consistent with our findings, a positive statistically significant correlation was found between parity and body mass index and similar results were reported by.[21–24] Koch et al.[25] showed that increased body mass index was more prevalent among multiparous women and that a positive association coexists between parity and body mass index. Our study found similar findings where independent predictors of body mass index among post-menopausal women were parity and breast-feeding durations which were statistically significant whereas menarche age and age at menopause were not statistically significant predictors. It is important to carry out further research in this area to determine the nutritional and health status among the post-menopausal women. The recommendations arising from this study are public health intervention programs which are a necessary part of educating the post-menopausal community especially the rural in tackling the issues related to the menopausal phase. Also, as the data is collected in retrospect and it is also important to carry out nutritional counselling during pregnancy and post-natal stage at maternal health centres to prevent the complications arising in post-menopausal phase. According to Ref. 26 nutritional status is sub optimal among post-menopausal women in this selected area hence women entering the menopausal status should be educated on the different aspects of menopause and the methods to reduce disease burden during that phase. Nutrition education and encouraging to increase the physical activity level will be helpful in preventing any non-communicable diseases among this population. Women with multi parity should be provided with the necessary information to reduce weight gain during pregnancy and to maintain ideal body weight between successive pregnancies. Exclusive breastfeeding should be encouraged considering all the benefits for the mother and infant. The study gives valuable scientific evidence for the post-menopausal women and about their weight gain. Due to the increased prevalence of non-communicable diseases prevention strategies needs to be taken to minimize obesity. As parity and breastfeeding practices are data in retrospect action must be taken to minimize complications of different disease conditions among increasing post-menopausal community in India.

## 6. Limitations

1. Small sample size due to convenience sampling which restricts in generalizing the findings.
2. Breastfeeding data may not be accurate as it was self-reported, and it was dependent on the memory recall of the subject. It may be subjected to over reporting or under reporting.

## 7. Conclusions

It was observed that multi parity increases the risk of increased body mass index among post-menopausal women. Increased duration of breastfeeding reduces the body mass index. Based on the finding's measures should be taken to prevent obesity in later life by encouraging to breastfeed for longer duration.

## Conflicts of interest

The authors declare no potential conflicts of interests.

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None.

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