

Assessment of Dietary Status and Correlated Factors Among Lactating Mothers in Rural Areas of Yamuna Nagar

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Abstract

Lactating mothers are often at augmented risk of nutritional insufficiencies throughout the lactation period owing to physiological variations, unsuitable dietary patterns, and numerous socio-demographic patterns. The present study was undertaken to examine the nutritional status, dietary intake, and correlated factors among lactating mothers of the various villages. A population-based study was steered in the rural area of Yamuna Nagar, Haryana (India) from July-August 2021 that included 203 lactating mothers with annual income below 6 lakhs. To study the participants' calorie intake and their nutritional status, a standard questionnaire was developed. The data was analyzed using SPSS software using Pearson's correlation coefficient and independent t-test where $p < 0.05$ was considered statistically significant. The result showed a significant difference in the intake of calories that varied with age, body mass index (BMI), annual income, and the nutrients (iron, calcium, protein, fat, carbohydrate, and folic acid) consumed. An insufficient consumption of protein, calcium, folic acid, and sodium was observed followed by the low-calorie uptake. However, the intake of iron and carbohydrates (women with >18 years) was near to adequate in the women of rural areas. Thus, the study concluded that the lactating mothers among rural population have deprived nutritional stores. Appropriate nutritional management and patterns during the lactation period are of major concern.

Keywords

Lactation, Nutritional status, Dietary pattern, Rural population

Introduction

Child feeding practices are important for achieving adequate nutrition and for the survival of the young one. Breastfeeding is very important as it provides both nutrition for growth, development and virtuous health and energy to the infants and newborn. Thereafter, to meet their growing nutritional requirements, infants should receive certain complementary foods while breastfeeding continues for up to 2 years of age or beyond [1]. Nutritious dietary pattern has both long and short-term advantages, thereby benefiting both children as well as mothers [2]. Lactating mothers are often at augmented risk of nutritional insufficiencies throughout the lactation period owing to physiological variations, unsuitable dietary patterns, and numerous socio-demographic patterns [3]. For the optimum production of breast milk, nutrients such as iodine, essential fatty acids, vitamin A, B1, B2, B6, and D are essential [4]. Insufficient calorie consumption for a long period can lower both the quality and quantity of breast milk leading to malnourishment of infants [5]. For the well-being of society nutritional status of children and women should be good as it affects the overall status of food security, social conditions, and general health [6]. Therefore, it is important to check the nutritional status and dietary consumption of lactating mothers mainly in

resource-deficit settings [7]. Some studies have discussed the dietary intake of lactating mothers in Iran [8-12]. In one of the studies, it is reported that recommended calorie intake and the intake of essential nutrients like calcium, zinc, magnesium, copper, and vitamin A, D, B and C were insufficient during the lactation period in rural and urban areas of Khorramabad, Lorestan, Iran [13].

It has been reported that the calorie consumption of lactating mothers was less than the Dietary Reference Intake (DRI) in the northern provinces of Iran (East Azerbaijan and Mazandaran) [9, 10]. Another study conducted in Khorramabad revealed a sufficient intake of macronutrients and energy but a lack of micronutrients like iodine, calcium, phosphorus, magnesium, zinc, and the vitamins B2, B9, A, D and C [10]. The nutritional status of lactating mothers is often overlooked when compared to prenatal nutrition [14]. Studies in different countries have also indicated nutrient insufficiencies and inappropriate nutritional patterns in lactating mothers [2, 15, 16]. Further study in this area is the need of the hour due to the relevance or significance of sufficient dietary consumption during lactation, limited literature, and lack of nutrition education among people. In the present study, we have examined the nutritional status, dietary intake, and correlated factors among lactating mothers of the various villages nearby Yamuna Nagar, Haryana (India) with the aim to contribute to the formulation of suitable dietary supplements and guidance to the lactating mothers.

Material and Methods

The present cross-sectional population-based study was steered in Yamuna Nagar, Haryana, and its nearby villages (India) from April-July 2021. The study included 203 lactating mothers. The selection method was random and the lactating mothers of 16 years or above and willing to participate were included in the study. The participating women were breastfeeding mothers of 16-32 years from villages like Buria, Damla, Kherakaln, Jathlana, Chhachrauli, Atawa, Bamboli, Bilaspur, Kalesar, Gumthala, Kherakalan, Manakpur, Lalchapar, and Ganauli Anganwadis. A questionnaire was designed to obtain socio-demographic characteristics, clinical data, habits, perceptions among women, working hours and breastfeeding routine. Face-to-face questionnaires were filled out by the lactating mothers. The height of participants was measured with measuring tape and the weight was determined using a weighing machine to the nearest 0.1 kg kept on a flat firm surface. The weight machine was calibrated using a standard 20 kg weight and the participants were asked to wear light clothes and barefoot. BMI was calculated by squaring the height and dividing it by weight (kg/m^2). All the data was taken in duplicate. The nutritional status of the lactating mothers was taken based on questionnaires including their daily uptake of food items like fruits, vegetables, milk products, nuts and dry fruits, and eggs. The calories, macronutrients and micronutrients in the food was calculated using the table 1 given in the book 'Nutritive value of Indian foods' [17]. The adequacy of calorie intake was determined by dividing the actual intake by the required intake. The energy, micronutrients, and macronutrient content of the food were calculated using applications like

Table 1: The socio-demographic parameters of participants.

Variables	Frequency (%)	Average calorie intake
Age (in years)		
16-18	28(13.79)	977.53
19-24	127(62.56)	1231.9
25-34	48(24.13)	1392.3
Number of children		
Less than or equal to 1	127(62.56)	1164.7
More than 1 less than or equal to 3	76(37.43)	1353.9
BMI		
Less than 18.5	133(65.51)	1110.7
18.5-24.9	67(33.004)	1465.8
25-30	3(1.486)	1628

nutritionist IV software (N-squared computing, San Bruno, CA, USA). The adequate energy intake was calculated by dividing actual intake by recommended calorie intake. Energy intake of less than 80%, 80-100%, and more than 100% were considered as low intake, adequate intake, and high intake respectively. The data was calculated and analyzed using IBM SPSS statistics 2.0 software. The descriptive facts were stated as frequency distribution in tabular format. The mean of DRI system of nutrients recommended and the mean of nutritional variables was analyzed using an independent t-test. To find out the statistical correlation between nutritional variables and parameters of interest, the Pearson correlation coefficient was used. $P < 0.05$ was considered statistically significant. The study was approved by the ethics committee of Guru Gobind Singh College of Pharmacy, Yamuna Nagar, Haryana (code: GGSCOP/2021/482a).

Results

The mean age of the participants was observed to be 22.2562 ± 3.33 years and 48(24.13) came under the 25-32 years category. The mean height, weight and BMI of the participants were $5'17'' \pm 0.37$, 45.45 ± 6.19 kg and 18.03 ± 2.99 kg/m^2 , respectively. There was no worthy difference in intake of calories between varying groups of age, BMI, and number of parities (babies). The preference for supplements, mishaps like abortion, stillbirth, and miscarriage, and undesirable habits among women like intake of alcohol, tobacco chewing, and cigarette smoking varied among women with age. Preference for supplements increased with age up to 93.75% (women between 25-32 years of age) from 74.01% and from 46.42% (women between 16-18 years of age). The number of mishaps also decreased with age from 50% (women between 16-18 years of age) to 16.53 (women between 19-24 years of age) up to 4.08% (women between 25-32 years of age). Similarly, the undesirable habits among women decreased with age from 21% (women between 16-18 years of age) to 5.51 (women between 19-24 years of age) up to 4.08% (women between 25-32 years of age) as shown in table 2. It was also observed that income has a negative correlation with average calorie intake. The amount of nutrients, and choice of lactating mothers depend on the income of the family as depicted in table 3. The nutrient intake and energy of the participants with respect to DRI are mentioned in table 4. The observed values for energy

Table 2: Effect of age on various factors/preferences.

No. of lactating mothers	Age (in years)	Supplements preferred (SP)	SP%	Undesirable habits (UH)	UH%	Mishaps (MH)	MH%
28	16 - 18	13	46.42	6	21.42	14	50
127	19 - 24	94	74.01	7	5.51	21	16.53
48	25 - 32	45	93.75	2	4.08	2	4.081

Table 3: Effect of annual income on average calorie intake.

Annual income (As per family ID)	Number of lactating mothers	Average calories
2-4.99 lakh	44	868.9±75.74
5-5.99 lakh	108	1327.07±171.63
> 6lakh	51	1358.19±190.9

were statistically lesser ($p < 0.00001$) than the recommended dietary allowances (RDA), however, the quantity of consumed carbohydrates was adequate ($p < 0.00001$). However, the amount of iron consumed was higher than the recommended values (% DRI). Furthermore, the protein, sodium, folic acid, and calcium of the lactating mothers were significantly less than the dietary recommended levels ($< 75\%$ DRI). There was a positive correlation between the intake of nutrients and age and BMI as depicted in table 5. The results were significant with $p < 0.05$.

Discussion

The current study is intended to observe the dietary intake, nutrition, and associated factors among lactating mothers in the villages of Yamuna Nagar, Haryana. As per BMI classification, about 65.02% of participants were underweight, 33.49% were having normal weight and 1.47% of lactating mothers were overweight. BMI before pregnancy has a sig-

Table 5: Correlation between macronutrients and energy with age and BMI of lactating mothers.

Parameter	Age		BMI	
	R	P	R	P
Energy (kcal)	0.529	< 0.00001	0.77	< 0.00001
Protein (g)	0.51	< 0.00001	0.75	< 0.00001
Carbohydrate (g)	0.53	< 0.00001	0.77	< 0.00001
Fat (g)	0.53	< 0.00001	0.75	< 0.00001

R: Pearson correlation coefficient.

nificant impact on the weight of women during pregnancy and weight retention after the delivery [18]. The risk of weight gain is more during the 2 years after delivery mostly in women who were obese before pregnancy [19]. Though, in the absence of groupings for the weight of nursing mothers, the data on postpartum BMI should be analyzed with care [2]. With age, BMI and number of parities significant variances were observed with respect to calorie intake. In terms of age, those in the range of 25-32 years had a high-calorie intake followed by women of 19-25years, whereas those between 16-18 years old had a low-calorie intake. Mothers under 18 years of age require significant attention as they are liable to suffer complications owing to malnutrition. According to World Health Organization, lactating mothers require more nutrition as compared to adults owing to their physical development [20]. Based on research adolescent mothers undergo several dietary

Table 4: Calorie intake with respect to age.

Age in years	Macronutrients and micronutrients	DRI	Energy and nutrient uptake	%DRI	p value
14-18	Calories/Energy kcal	2380	977.53 ± 196.7	41.07268908	< 0.00001
> 18			1276.8 ± 235.76	53.64705882	< 0.00001
14-18	Carbohydrates (g)	210	146.89 ± 29.33	69.94761905	< 0.00001
> 18			191.84 ± 35.24	91.35238095	< 0.00001
14-18	Protein (g)	71	36.77 ± 7.94	51.78873239	< 0.00001
> 18			48.07 ± 8.85	67.70422535	< 0.00001
14-18	Fat (g)	ND	27.58 ± 5.73	ND	< 0.00001
> 18			35.73 ± 6.71	ND	< 0.00001
14-18	Iron (mg)	10	29.35 ± 6.70	293.5	< 0.00001
> 18		9	35.43 ± 6.85	393.6666667	< 0.00001
14-18	Folic acid (µg)	500	248.42 ± 88.69	49.684	< 0.00001
> 18			316.23 ± 61.81	63.246	< 0.00001
14-18	Calcium (mg/d)	1300	416.6 ± 109.90	32.04615385	< 0.00001
> 18		1000	593.25 ± 142.7	59.325	< 0.00001
14-18	Sodium (mg/d)	1500	1369.35 ± 121.06	91.29	< 0.00001
> 18			1334.28 ± 149.8	88.95	< 0.00001

variations in pregnancy. It has been observed that pregnant women consume spicy foods, fast food, and soda in place of fruits, vegetables, and dairy products [21]. The age difference between adolescents and adults is known to affect dietary habits.

In our study the high-calorie intake was observed in older women; 1392.3 as compared to younger women; 977.53. It may be attributed to the food preference, socioeconomic status, lifestyle, and inadequate prenatal care of younger *vs* older women. Further research on the effect of age on the nutrient intake of mothers is recommended.

Low-calorie intake is observed in underweight lactating mothers [22,23]. Low-calorie intake results in loss of weight of both child and mother. Therefore, dietary counseling regarding the importance of including variety in diet containing required calories will help in attaining good health and normal weight for both child and mother [24].

Family income also affected the calorie intake of lactating mothers as all the mothers can't afford high-priced nutritional products.

Similar results were reported in one of the studies done by Rao et al. [25] in which low-calorie intake and energy deficit (19–24%) were observed in rural lactating mothers. The deficit of proteins, iron, folic acid, vitamin A and riboflavin levels was observed. As per RDA, more than 70% of women didn't meet even 50% of the requirement for iron and vitamin A in both areas (tribal and rural). The nutritional status of women has a great impact on birth weight as compared to other factors [26]. The nutritional status of women in rural areas is very less as compared to recommended levels [27].

In another study conducted in Brazil [28] and Bangladesh [29] calorie intake was less than the recommended intake. Similar results were reported in two other Iranian studies, in Ayatollahi [8] and Mahdavi et al. [11], calorie intake was less than RDA among lactating mothers. The reason for low-calorie intake was social pressure on women to reach their pre-pregnancy weight [3]. Inadequate calorie consumption may lead to exhaustion of body reserves and can cause damage. The results of the present study indicated that the intake of calcium, sodium, folic acid, and proteins by lactating mothers was insufficient. In one of the studies conducted in Khorramabad, deficiency of iodine, calcium, magnesium, zinc, phosphorous, vitamin B2, B9, C and D was observed in lactating mothers [10]. Another study of lactating mothers in Tehran reported deficiencies of vitamin B6 and B9, zinc and calcium among urban women [30].

The deficiency of calcium is associated with less consumption of dairy products which is a solemn peril issue during lactation. Consumption of fruits and vegetables is also less in one of the studies conducted in Maku (Iran) i.e., less than three servings in a day which was associated with less consumption/deficiency of micronutrients by lactating mothers. Lactating mothers must consume good quantity of fruits and vegetables to meet the nutritional requirements [24] as they are good sources of vitamins and minerals. Protein intake must also be sufficient to prevent a negative nitrogen

balance [31]. In our study protein intake was less than the daily recommended levels.

It was observed that with increase in BMI and age the calorie intake among women increased. A similar observation was seen in Malaysian women, there was a positive correlation between BMI and energy intake [32].

The results reveal that there was a positive correlation of age with BMI, calorie intake, protein, carbohydrates, fat, folic acid, calcium, iron, and sodium intake. There was a negative correlation between age and the number of mishaps like abortion, stillbirth, and miscarriage, and the undesirable habits among women like intake of alcohol, tobacco chewing, and cigarette smoking. With age, the women become more cautious about their diet, posture, and lifestyle.

The key strength of the present study was that it mainly targeted the rural area women who lack exposure to status or modern techniques or supplements, education, and are mostly malnourished. It helped us to study the differences among women of various age groups and incomes in rural areas. The use of the questionnaire helped us to collect the data without recalling the dietary schedule for a long period of time. Data was taken on specific days and was easy to analyze, which provided an interesting relationship among various study parameters.

Conclusion

It was observed that during the lactation period the dietary requirement of essential nutrients like proteins, calcium, sodium, and folic acid was not met as per recommended dietary allowances. To promote health and improve the nutritional status of lactating mothers in rural areas, proper nutrition education and proper eating patterns must be taught. Their diet must include nutrition-rich foods rich in macronutrients and micronutrients so that both mother and infant are healthy. Further research may be conducted in different regions of India to know and improve the nutritional status of lactating mothers.

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Conflict of Interest

None.

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