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A Study on the Nutritional Status and Dietary Patterns Among Lactating Mothers in Rural Areas of Jagatsinghpur District, Odisha

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Abstarct

Background: Nutritional status is affected by external factors like food safety, cultural practices, social and economic conditions, and internal factors like age, sex, physical activity, and health. Women in low-income countries are highly susceptible to malnutrition. In India, it has been estimated that one-fourth of women of reproductive age have a BMI below 18.5 kg/m². Lactating mothers need an extra 520-600 kcal/day to meet the energy needs of breastfeeding. Proper nutrition during lactation is crucial in ensuring that the energy, protein, and nutrient content of breast milk, thus the significance of focused dietary interventions at this period.

Method: A cross-sectional study was conducted over three months through household visits in rural Jagatsinghpur, Odisha. The sample size of 170 was calculated using OpenEpi, based on a 28.7% malnutrition prevalence among women aged 15-49 in Odisha (NFHS-4), with 10% precision and a design effect of 2.

Result: The majority of lactating mothers were housewives 91.8%, with 54.7% having had high school education. Most of the mothers 88.8% took 3-4 meals a day and had an average caloric intake of 1868.94kcal, mainly from lunch 618.38 kcal. Most were of normal BMI 62.4%, while 24.7% were overweight. Socio demographic factors such as caste, education and spacing between children were also significantly associated with maternal BMI.

Conclusion: The dietary intake of lactating mothers was significantly below the RDA, with an average of 1868.94 kcal. Though most mothers had a normal BMI, their consumption of basic nutrients like iron-folic acid (IFA), vitamins, and supplements, and also albendazole, was found to be inadequate. There is a need for comprehensive nutritional education of mothers and their families to enhance health outcomes for mothers and their babies.

Keywords: Nutrition, BMI, Lactating Mothers, Diet, RDA.

Introduction-

Nutritional status reflects an individual's health condition, shaped by the quality of nutrients they consume and their utilization for metabolic requirements [1]. An individual's nutritional status is influenced by both external factors, such as food safety, culture, social and economic conditions, and internal factors, including age, sex, nutrition, behaviour, physical activity, and existing health conditions

[2]. Women from low-income countries are particularly susceptible to nutritional deficiencies [3]. This vulnerability is heightened during gestation and lactation, and frequent pregnancies in malnourished lactating women significantly impact both maternal mortality and child health [3]. UNICEF reports that undernourished girls are more likely to become undernourished mothers, leading to low birth-weight infants [4]. In India, approximately one-fourth of women of reproductive age have a Body mass index (BMI) below 18.5 kg/m² according to NFHS 4 [4]. Studies indicate that maternal stunting and anemia significantly contribute to maternal mortality [5-8]. Various maternal health conditions, along with other factors, can result in abnormal pregnancy outcomes, including low haemoglobin levels associated with postpartum haemorrhage, which poses a risk to maternal health [5-8].

A healthy diet is crucial for positive pregnancy outcomes, normal growth, and overall well-being. During lactation, women require additional calories to meet their nutritional needs [9-11]. According to ICMR guidelines, well-nourished lactating mothers (LMs) should aim for approximately 2730-2650 kcal per day [9]. However, it's essential to consider individual factors such as age, BMI, physical activity level, and the extent of lactation when determining the specific calorie requirement [12-15]. Adequate nutrition during lactation not only supports the mother's health but also ensures optimal growth and development for the infant [12-15].

Rationale of the Study-

The lactation period is crucial for meeting the nutritional needs of an infant [16]. Therefore, special attention should be paid to a woman's diet during lactation to support the health and growth of both the mother and child, as well as aid in the mother's postpartum recovery [16]. The dietary habits of lactating mothers in India often lack essential nutrients, leading to issues such as anemia and under-nutrition [17]. Given the regional variations in dietary patterns among lactating mothers [17], and considering that 28.7% of women (aged 15-49) in Odisha experience malnutrition (according to NFHS 4) [18], this study aimed to assess the nutritional status of lactating mothers residing in rural areas of Jagatsinghpur.

Objective

The objective of the study was to find out the nutritional status and food consumption pattern of lactating women of rural areas of Jagatsinghput district , odisha.

Method

A cross-sectional study was conducted in the Naugaon block of Jagatsinghpur, Odisha, between February and May 2021. The study included mothers who were breastfeeding their children, aged between 0 and 24 months, during the research period.

We determined the sample size of 170 based on the malnutrition rate of 28.7% among reproductive aged women (15 to 49 year) [18], a precision of 10%, and design effect of 2, with 95% confidence level, as calculated using the OpenEpi tool.

In Jagtsinghpur district, Naugaon block was selected on the basis of low literacy rate. Multi-stage cluster sampling was done to determine sampling area. In the Naugaon block, there are three sectors. Among them, the Naugaon sector has highest recorded lactating mothers which is 633. As Naugaon sector has five sub-centres, we concentrated on two sub-centres for data collection where highest number of LMs were registered. From the two sub-centres, which consist of 19 anganwadi centres (AWCs), nine participants were randomly chosen from the area served by each AWC using simple random sampling.

1.1 Data collection tool :

A semi-structured schedule was developed based on prior studies and refined through expert consultation. Household visits facilitated data collection, while anthropometric measurements were obtained using a stadiometer and weighing machine.

1.2 Data analysis :

Analysis was done with the help of SPSS version 20.0. Descriptive statistics such as percentage and proportions were calculated. A chi-square test was done to find out the association between two or more variables. P value of <0.05 was taken for statistical significance. The Nutritionix website was used to estimate daily calorie intake by looking up specific foods and modifying serving sizes according to participant-reported intake.

Result

Table 1 outlines the socio-demographic characteristics of 170 lactating mothers. Most participants (59.4%) were aged 25-30, with 21.2% aged 20-24. The majority identified as general caste (55.9%) and 54.7% of the participants completed high school. A significant number, 156 (91.8%) were homemakers, and 76.5% lived in joint families. Additionally, 55.9% reported a monthly family income below ₹10,000. In terms of obstetric history, 58.8% were primiparous, 33.5% had their second pregnancy, and 7.6% had three or more pregnancies. Among those with multiple pregnancies, 71.4% had an age gap of more than 3 years between their breastfed child and the previous child.

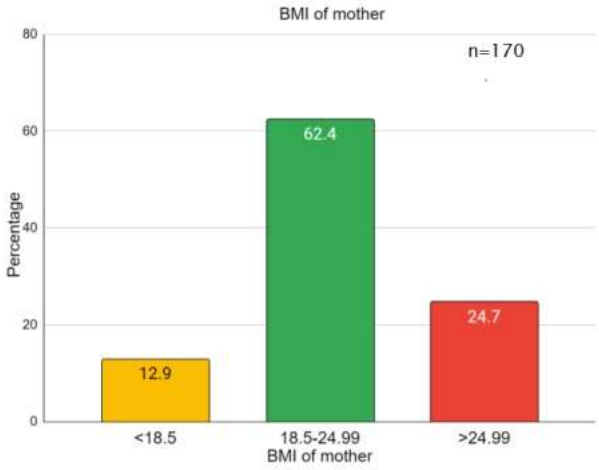
Table-1 Socio-demographic status of LMs

Socio-demographic status		**Frequency (n=170)**	**Valid Percent**
Age of Mother	20-24	36	21.2
	25-30	101	59.4
	31-35	22	12.9
	36-40	11	6.5
	Total	170	100.0
Caste of the mother	General	95	55.9
	OBC	40	23.5
	SC	35	20.6
	Total	170	100.0
Educational status of the mother	Illiterate	7	4.1
	Primary	16	9.4
	High school	93	54.7
	Secondary	21	12.4
	Graduate	30	17.6
	Post graduate	3	1.8
	Total	170	100.0
Occupation of the mother	House wife/non-working	156	91.8
	Working women	14	8.2

	Total	170	100.0
Family type	Nuclear family	40	23.5
	Joint family	130	76.5
	Total	170	100.0
Family income per month	below 10000	95	55.9
	10000-30000	66	38.8
	Above 30000	9	5.3
	Total	170	100.0
Obstetric history	Primipara	100	58.8
	2nd	57	33.5
	3rd or more	13	7.6
	Total	170	100.0
Age gap between 2 children	less than 3 yrs	11	15.7
	3yr	9	12.9
	more than 3 yrs	50	71.4
	Total	70	100.0

Figure 1 displays the BMI distribution of lactating mothers (LMs). 62.4% respondents had normal BMI (18.5-24.9 kg/m²) , whereas 24.7% were overweight(25-29.9 kg/m²), and 12.9% were underweight (<18.5 kg/m²).

Figure 1 : BMI of the mothers



The table-2 shows the association among several socio-demographic determinants with the BMI of lactating mothers. It has established all three variables cast, education, and age interval generalized concerning mothers and their BMI. The highest percentages of normal and overweight BMI were recorded at 33.5% and 18.8%, respectively, for mothers of General caste. Highest percentages of involvement were under-weight with mothers of the OBC category at 6.4%. The association was statistically significant, with p-value 0.002. In education, a majority of mothers with normal BMI were seen from high school and graduate levels, at 34.7 and 14.1%. Mostly of overweight mothers were also high school educated (14.7%). Underweight mothers were rare at all levels of education but were slightly high among those with a high school and secondary level of education (5.2%). A strong

relationship associated with education and BMI was highlighted with a p-value of 0.001. Normal BMI children waited for over three years in age difference from the majority of mothers: 48.5 percent, while overweight mothers shared almost the same age gap: 18.5 percent. And the p-value of 0.018 also underscored that the age gap was well related to BMI. In short, all these findings speak critically on socio-demographic factors that like caste, education level, and age gap have implications on the BMI of lactating mothers, thereby offering important pieces of information for public health interventions.

Table-2 Association of BMI with socio demographic status

Socio demographic status	**BMI of the lactating mother**			**P value**
Caste of mother	**Under (< 18.5)**	**Normal (18.5-24.99)**	**Over (>24.99)**	p= .002
General	6 (3.5)	57 (33.5)	32 (18.8)	
OBC	11 (6.4)	24 (14.1)	5 (2.9)	
SC	5 (2.9)	25 (14.7)	5 (2.9)	
Educational status				
Illiterate	1 (0.5)	5 (2.9)	1 (0.5)	p= 0.001
Primary	2 (1.17)	11 (6.4)	3 (1.7)	
High school	9 (5.2)	59 (34.7)	25 (14.7)	
Secondary	9 (5.2)	7 (4.11)	5 (2.9)	
Graduate	0 (0)	24 (14.1)	6 (3.5)	
Post graduate	1 (0.5)	0 (0)	2 (1.1)	
Age gap between the breast-fed child and previous child				
Less than 3 yr	1 (1.4)	10 (14.2)	0(0)	p= 0.018
3yr	4 (5.7)	4 (5.7)	1 (1.4)	
More than 3 yr	3 (4.2)	34 (48.5)	13 (18.5)	

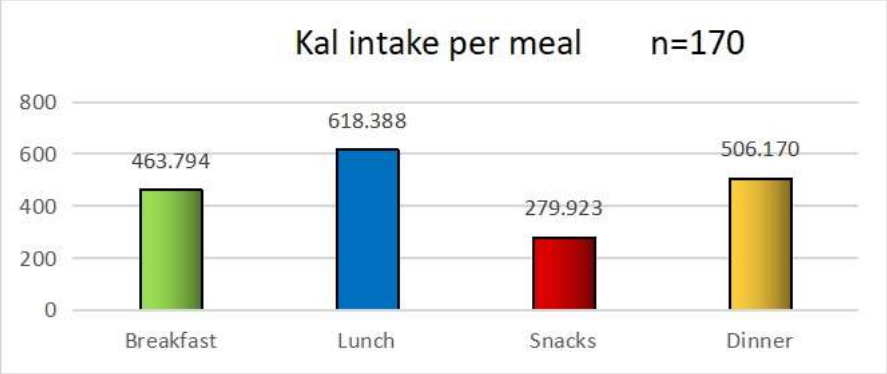
Table 3 illustrates dietary habits: 91.2% were non-vegetarian, and 88.8% used to eat 3-4 times a day. Additionally, 84.7% were consuming green vegetables more than three times a week, and 92.4% were regularly eating pulses.. However, Milk, milk product and fruits were less consumed. 38.8% and 57.1% participants reported of not consuming milk or milk product and fruits respectively. Meat products were eaten ≤3 times/week by 77.1% of women. Vitamins, IFA, and Albendazole intake was low: 72.4%, 82.4%, and 92.4% did not take these supplements, respectively.

Table-3 Dietary information of LMs

Dietary information		Frequency (n=170)	Valid Percent
Type of diet	vegetarian	15	8.8
	Non vegetarian	155	91.2
	Total	170	100.0
Frequency of eating food in a day	less than 3	2	1.2
	3-4 times	151	88.8
	more than 4 times	17	10.0
	Total	170	100.0
Frequency of intake of green vegetables	3 or <3 times/ week	26	15.3
	>3 times/ week	144	84.7
Frequency of intake of pulses	3 or <3 times/ week	13	7.6
	>3 times/ week	157	92.4
Frequency of intake of milk and milk products	3 or <3 times/ week	58	34.1
	>3 times/ week	46	27.1
	Never	66	38.8
Frequency of intake of fish, egg, meat	3 or <3 times/ week	131	77.1
	>3 times/ week	23	13.5
	Never	16	9.4
Frequency of intake of fruits	3 or <3 times/ week	56	32.9
	>3 times/ week	17	10.0
	Never	97	57.1
	Total	170	100.0
Taking of vitamins	yes	47	27.6
	no	123	72.4
Intake of IFA	yes	30	17.6
	no	140	82.4
Albendazole intake	yes	13	7.6
	no	157	92.4
	Total	170	100.0

Figure 2 depicts the average daily calorie intake of lactating mothers. The average intake was 1868.94 kcal per day, with the highest intake during lunch at 618.38 kcal, followed by dinner at 506.17 kcal, and breakfast at 463.79 kcal. Evening snacks accounted for the lowest intake at 279.92 kcal. Only 12.35% of women met the recommended daily calorie intake of 2730-2650 kcal per day [9].

Figure 2: Average daily calorie intake of lactating mothers



Discussion

In age wise distribution of study subjects, it was found that the majority of participants were from age groups 25-30 I.e. 59.4%, but in North Karnataka study done by Antony et al. majority belong to 20-25 age group I.e. 63% [3]. So far educational status concern , we found that 54.7% had high school pass where in North Karnataka study only 29% had high school education and about 15% were illiterate, which is quite more than our study which is only 4.1% [3].

Occupation wise, we found that the majority of mothers were house wives 91.8% but similar study conducted in Nigeria by Ukegbu patricia Ogechi only 21.7% were full time house wife, majority of mothers are civil servants, which is 37.5% [19].

According to obstetric history 58.8% were primipara where study conducted by Sarmila et al. in West Bengal 52.8% were primipara which is quite similar [2]. Difference between two studies which show the age gap between the last two children, which shows only 15.7% have an age gap below 3 yrs but in WB study, 41.5% have less than 3 yr [2]. 84% of lactating mothers were found to have an age gap of 3 and more than 3 years, but only 58.5% had >=3 yr age gap in the west Bengal study [2].

In several study it was been found that maternal obesity has a -ve impact on duration of breast feeding and delayed lactogenesis. In a recent study it was reported that the prevalence of obesity among lactating mothers was 28.9% in both developed countries and developing countries. According to the perinatal European Health Report, 30% of pregnant women are obese in most European countries. The prevalence of overweight and obese is Croatia, Austria and Slovenia are less than 30% were in UK it's about 50% [20]. In the present study, obesity was found in only 24.7% of lactating mothers and the majority of mothers have normal weight, which is 62.4%. But in North Karnataka study obesity was found in only 8%. But underweight was found to be high about 43% [3] but in the present study the percentage of underweight was only 12.7%.

As per report, efficiency of iron, vitamins and zinc are commonly seen in lactating mother and their infants [21]. But in present study it has been reported that the majority of mother didn't take vitamins and other supplements, iron and Albendazole which is 72.4%, 82.4% and 92.4% respectively.

According to RDA, the average calorie intake of a lactating mother should be 2730-2650 kcal [9] but in the present study the average calories intake was 1868.9 kcal which is significantly lower than the RDA. Antony et al study the average kcal intake by LM was 1896kcal [3], in Malhotra et al study it was 1986.8 kcal [22]. In present study, it has been seen that though the majority of mothers were of normal BMI but they were not eating proper amount of food in order to lose weight post pregnancy, which will

lead to micro nutrient deficiency and will affect the sufficient milk production and nutrient contain of breast milk.

In the present study we found that the caste of the mothers had a significant relationship with BMI (p= 0.002) but in the WB study, religion of the mother has significant relationship with BMI (p= 0.01) [2]. In both of the studies show that the interval between two children had a significant relationship with BMI where p= 0.018 in present study and p= 0.0008 in WB study[2]. But the educational status of lactating mothers shows a significant relation with BMI in the present study (p=0.001) where in WB study qualification of the mother had no relation with BMI [2].

Limitation **-** Calorie intake was assessed using the 24-hour recall method, relying entirely on participants' self-reports. Variations in data could occur due to factors like fasting, dieting, and other personal influences, making it challenging to precisely determine calorie consumption based solely on reported food intake. For more accurate calorie counting, future studies could benefit from incorporating methods such as weekly diet recall.

Conclusion

The study aims to investigate significant nutritional issues among lactating mothers in the rural area of Jagatsinghpur, Odisha. The point that 62.4% of the participants had a normal BMI illuminates the stark variances, with almost a quarter (24.7%) being overweight while 12.9% were underweight. Caste, education, and child-spacing have strong associations with BMI, emphasizing the socio-demographic influences on nutritional health. The green vegetables and pulses were consumed, but fruits, dairy products, and such important supplements such as iron-folic acid IFA, vitamins, and albendazole were poorly consumed with 82.4%, 72.4%, and 92.4% of mothers not taking them, respectively. The average daily caloric intake was only 1868.94 kcal, which is far below the requirement for a lactating mother and only 12.35% of them achieved this required value. This depriving of caloric intake and micro-nutrients would efficiently work against maternal health and the quality of breast milk that would have an effect on growth and development of the child.

Addressing the gap, nutritional education and interventions should target to improve the diet of fruits, dairy, and essential micro-nutrients in their diet. Against socio-demographic variables that influence maternal nutritional status, overall policies and programs should be formulated. Thus, it would require holistic and culturally appropriate plans for the improvement of diet and health concerning lactating mothers and their offspring.

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