Original Article

Dietary behaviour and anthropometric parameters across the spectrum of pregnant and lactating mother, infant, young children, adolescent girls and reproductive age group females: An assessment of undernutrition among KOL tribe

Surbhi Yadav[1], Shamshad Ahmad[2], Neha Chaudhary[2], Mahendra Kumar[3], Anju Gahlot[4]

[1]Rama University, Kanpur, Uttar Pradesh, [2]Department of Community and Family Medicine, AIIMS, Patna, Bihar, [3]Chief Development Officer, Kanpur Nagar, Uttar Pradesh, [4]Rama Medical College Hospital and Research Center, Kanpur, Uttar Pradesh, India

ABSTRACT

Introduction: The Kol is an ancient tribal community, who resides in the backward Bundelkhand and Baghelkhand regions bordering UP and MP. Reports claim the high level of exploitation and marginalisation of them by feudal landed landlords. Due to the dearth of studies on Kol community their plight hasn't been addressed effectively so far. Thus, this study was undertaken to assess the dietary behaviour and anthropometric parameters across the spectrum of Maternal, Lactating, Infant, Young Children, Adolescent girls, and reproductive-age women (MIYC-AR) of Kol Community. **Methodology:** It was a descriptive observational cross-sectional study, conducted over a period of 6 months; in hard to reach area of Manikpur block, Mangawa, in Chitrakoot district. Pregnant, lactating mothers, infant, young children, adolescent and reproductive age females who were found eligible, were included in the study. A total of 180 participants (30 from each group) were recruited by non-probability purposive sampling. A structured questionnaire was used to collect information regarding Iron folic acid and calcium intake, frequency of major meals and snacks, feeding history of infant and young child. Weight, height, head circumference and mid upper arm circumference were noted and the participants were classified accordingly. Statistical analysis was done using STATA version 13 software. **Results:** Only 36% and 30% of the pregnant and lactating mother, respectively, consumed IFA and calcium. The mean diet diversity score was inadequate for all the groups. Maximum among adolescents (70%) and half of the reproductive age group female (50%) were underweight. More than half of the infants (57%) were found to be malnourished on MUAC measurement, while the similar proportion among young children were found to be normal ($p < 0.001$). Half of the young children had timely initiation of complimentary feeding. But, none among young children received Vitamin A syrup. **Conclusion:** Significant higher prevalence of malnutrition was found among infants, adolescents, and reproductive age group females. Strengthening the public distribution system and rigorous supplementary nutrition services through ICDS are the priority intervention needed to address the poor nutritional status of tribe.

Keywords: Diet diversity score, Iron folic acid, mid upper arm circumference, tribe, undernutrition

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Introduction

The nutritional status of any person is his or her health dictated by quality of nutrients consumed. During the entire life span, nutrition plays a very crucial role in human health and development of life.[1] Physical growth, cognitive development, productivity, endurance and wellbeing all are affected by nutrition.[2] According to World Health Organization (WHO), the ultimate intention of nutritional assessment is to improve human health. Studies conducted in developing countries such as Nepal, Pakistan, India proved that undernutrition is posing a serious threat to physical, mental and social wellbeing of women.[3] Women being the care provider of family usually put their own health aside. A study conducted in Nepal proved that 18% women were malnourished and 35% were anaemic while studies in India (Kerala) reported 14.4% and in Pakistan 14% women were malnourished.[3-5] In a study conducted by Ferede, *et al.*,[6] prevalence was much higher, that is, 48.6%.

During period of pregnancy, to meet the requirement of growing foetus and maternal tissues more nutritional intake is needed by pregnant women.[7] Lactating mothers are also subjected to nutritional stresses due to feeding process.[8] Those from financially poor background fall in the category of nutritionally vulnerable group and vulnerability increases many folds in the case of tribal women.[8,9] Poor health of lactating mothers has repercussions on entire society. Understanding of poor nourishment in lactating mothers can also be used for prioritizing, designing, and initiating nutrient-specific interventions.[10]

In developing countries like India where gender discrimination itself is a major issue, girls are at higher risk of malnutrition. Being the future mother and to improve health, education, and nutritional status of women in a country; the wellbeing of adolescent girls is a matter of concern. The prevalence of Anaemia was highest (56%) among adolescent girls (age 15-19) in NFHS-3 report.[11] In a study conducted in a rural area of West Bengal, 35.8% adolescent girls had prevalence of underweight and another study conducted on nutritional status of adolescent tribal girls concluded that their nutritional status is deprived and majority were anaemic.[11,12]

Age 6–23 months old, that is. 'Window of opportunity' is the most important stage to optimize child growth and development and nutritional deficiencies can lead to irreversible damages.[13,14] For avoiding common childhood illnesses and micronutrient deficiencies in young children, optimum nutrition and good feeding practices along with Breastfeeding is fundamental.[15] In developing countries, prevalence of stunting and underweight remain high. According to WHO, less than 1/4th of children of age group 6-23 months met the minimum acceptable diet (MAD), meal frequency standard and diet diversity.[16] A study conducted in age group of 6–23 months, in Myanmar, reported that 20% were stunted and 43% were moderately anaemic.[14] While a study conducted in Pangkep reported the prevalence of undernutrition, stunting and wasting as 23.6, 17.8 and 23.0%, respectively, in

0–23 months of age.[17] To stimulate baby's immune system and provide protection to them from diarrhoea and ARI, exclusive BF in first 6 months of life plays a very crucial role.[18]

The Kol is an ancient tribal community whose reference is also found in medieval text of 16th century Rama-charita-manasa (The Lake of Rama's Deeds) and they reside in the backward Bundelkhand and Baghelkhand regions bordering U.P and M.P. In U.P their traditional and present-day occupation is collecting and selling woods and leaves from forest despite the fact they still haven't been accorded the tribal status.[19] Reports claim the high level of exploitation and marginalisation of them by feudal landed landlords.[20] In 2010, reports published in which it was informed that kol children in Shankargarh block were eating mud out of hunger which led to Supreme Court enquiry afterwards.[21] Due to the dearth of studies on Kol community their plight hasn't been addressed effectively so far.

Aim

To assess the dietary behaviour and anthropometric parameters across the spectrum of Maternal, Lactating, Infant, Young Children, Adolescent girls, and reproductive age women (MIYC-AR) of Kol Community residing in Chitrakoot, U.P.

Methodology

Ethical consideration

Ethical permission for conducting the study was obtained from the Institutional Ethics Committee. Prior to collecting the information, informed consent was taken from the eligible participants.

Study design

It was a descriptive observational cross-sectional study.

Study setting

The study was conducted in hard to reach area of Manikpur block, Mangawa, in Chitrakoot district.

Study duration

The study was conducted over a period of 3 months.

Study participants

Inclusion criteria

MIYC-AR available at their homes and willing to come when called upon by field health functionaries like ASHA, ASHA Sangini, ANM, Anganwadi worker, Anganwadi Sahayika.

Exclusion criteria

Reproductive age group Women, adolescent girls who left early morning for cutting down of wood from forest, pregnant ladies who were in their respective maternal house at some other places and lactating women who had lost their child (or were sick) were excluded from the study.

Number of groups to be studied, identify groups with definition

Infants (< 12 months age), Young Children (12-24 months age), Adolescent girls (girls from 11–19 years age group), Pregnant women (all trimesters, that is, first/second/third), Lactating women (one who were breastfeeding their child), Reproductive age group women (one from 15–49 years old).

Sampling population

Pregnant, lactating mother, infant, young child, adolescent girls and reproductive age group female of Kol community residing in Mangawa, Manikpur block of Chitrakoot

Sample size

Thirty participants from each age group were taken purposively. So, the total sample size for six age groups were 180.

Study procedure

Field functionaries divided MIYC-AR in two groups like MIYC (mother infant and young child) group and AR group (adolescent girls and reproductive age group female) and called those available at their homes. A structured questionnaire was used to collect information regarding Iron folic acid and calcium intake, frequency of major meals and snacks, feeding history of infant and young child. Height of pregnant, lactating mother, adolescent and reproductive age group female (M-AR group) were obtained by making them stand up on a broad tile using self-retracting measuring tape and their weight was measured by using analogue weighing machine. Body measuring flat tape was used to measure Hip circumference (in which widest part of hips was measured) and Waist circumference. Weight of Infant and young child (IYC) group was obtained by digital baby weighing scale and Recumbent length by laying down baby in curved weighing pan, knees were held straight by one of the functionaries, another field functionary hold 2 hard cardboards at both ends, that is, head and feet side. For measuring MUAC of infant and young child, Shakir Tape was used. Head circumference of infant and young children was recorded by measuring the occipitofrontal diameter. Diet Diversity Score of (M-AR) group was assessed by showing them charts. Similarly, IFA/Ca tablets strips were shown and were queried about its intake on regular basis. They were further questioned about frequency of their major meals and frequency of snacks consumption on the basis of 24 hour recall method. In Young Child group, mothers were asked when they started complimentary feeding of baby. For infants, mothers were questioned whether colostrum was given and when did Breastfeeding of baby was initiated. History of any episode of loose stool/ARI in the last 2 weeks was taken in Infants.

Data collection methods including settings and periodicity

Time to start up the data collection process was 10 am. Field functionaries used to call relevant group members on priority basis and by 11 am subjects used to turn up for studies. The duration of approximately 1 h was utilised to arrange instruments, documentation accessories and sitting arrangement. Data collected were used to start with access of socio-demographic details of subject and succeeded with questions pertaining to dietary behaviour and calculation of anthropometric parameters, and this whole process used to take 4–5 h per day. This process of data collection was carried out four times a week for almost 6 months.

Statistical analysis

The collected data were entered in Microsoft Excel worksheet and analysis was done using STATA VERSION 13 software. For categorical data, results were expressed in proportions. For continuous data, mean and standard deviation was used to express the result. Pearson's Chi-square test and ANOVA test were used for testing the significant association between the variables. Pregnant, lactating mothers, adolescent and reproductive age females were classified into underweight (<18.5), normal weight (18.5 to <25), overweight (25 to <30) and obese (≥30) according to the BMI. Nutritional status of infants and young children were classified into malnourished (<12.5 cm), at risk (12.5 to 13.5 cm) and normal (>13.5 cm) according to the MUAC. Also, WHO head circumference for age Z scores was used to classify the HC in infant and children.

Results

Table 1 presents the dietary behaviour of pregnant, lactating mother, young child, adolescent and reproductive age group female. Only 36% and 30% of the pregnant and lactating mother, respectively, consumed IFA and calcium, whereas none of the adolescent girls and young children ever consumed IFA and calcium ($P < 0.001$). The mean diet diversity score was inadequate for all the groups, with reproductive age female having maximum, that is, 3.9 ± 0.8. whereas young children had minimum, that is, 2.4 (1.43%). Regarding frequency of major meals, more than half of the pregnant females (53.3%) and maximum reproductive age group female (70%) were consuming three major meals. On the contrary, more than half of the lactating females (53.3%) were consuming two major meals only ($P < 0.001$). More than half of the pregnant females (57%) as well as half of the reproductive age group female (50%), use to consume snacks one time in a day. Whereas half of the lactating females use to consume no snacks at all ($P < 0.001$).
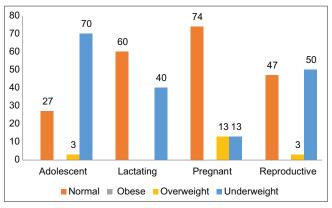
Figure 1 depicts the BMI categorisation of different KOL tribe group. Maximum among adolescents (70%) and half of the reproductive age group female (50%) were underweight. On the other hand, maximum among pregnant (74%) and lactating women (60%) were normal.

Table 2 presents the anthropometric measurements of all the groups belonging to the KOL tribe. Pregnant females had maximum mean BMI, that is, 21.4 ± 2.7 whereas, adolescent girls had minimum BMI among all the groups, that is, 17.7 ± 2.5 ($P < 0.001$). On the other hand, the value of mean waist/hip ratio was approximately similar across the group of pregnant, lactating mothers, reproductive-age women, and adolescent girls.

Table 1: Dietary behaviour of MYC- AR group of KOL tribe								
Groups	IFA/Ca Consumption *n* (%)	DDS (Mean±SD)	Frequency of major meals *n* (%)			Frequency of Snacks *n* (%)		
			1	2	3	0	1	2
Pregnant	11 (36.6)	3.7 (0.62)	0 (0)	14 (46.6)	16 (53.3)	12 (40)	17 (57)	1 (3)
Lactating	9 (30.0)	3.6 (0.60)	0 (0)	16 (53.3)	14 (46.6)	15 (50)	7 (23)	8 (27)
Adolescent Girls	0	3.7 (0.79)	-	-	-	-	-	-
Young Children	0	2.4 (1.43)	-	-	-	-	-	-
Reproductive age women	-	3.9 (0.80)	0 (0)	9 (30.0)	21 (70)	10 (33)	15 (50)	5 (17)
Test of significance (*P*)	Chi square (<0.001)	ANOVA (0.001)	Chi square (<0.001)			Chi square<0.05		

Table 2: Anthropometric measurement of MIYC- AR group of KOL tribe									
Groups	BMI (Mean±SD)	W/H ratio (Mean±SD)	Head Circumference				MUAC		
			(Mean±SD)	Malnourished *n* (%)	Normal *n* (%)	Obese *n* (%)	(Mean±SD)	Malnourished *n* (%)	At risk *n* (%)	Normal *n* (%)
Pregnant	21.4 (2.7)	0.80 (0.06)		-				-		
Lactating	19.8 (2.1)	0.80 (0.04)		-				-		
Reproductive age women	19.2 (2.3)	0.82 (0.04)		-				-		
Infants	-	-	38.8 (2.8)	3 (10)	25 (83)	2 (7)	12.1 (1.5)	17 (57)	6 (20)	7 (23)
Young Children	-	-	44.1 (1.9)	6 (20)	24 (80)	0 (0)	13.2 (0.87)	4 (13)	9 (30)	17 (57)
Adolescent Girls	17.7 (2.5)	0.81 (0.07)		-				-		
Test of significance (*P*)	ANOVA (<0.001)	ANOVA (0.6)	Chi square (0.21)				Chi square (0.001)			

Figure 1: BMI category of MIYC-AR group of KOL tribe

Table 3: Breastfeeding and complimentary feeding practice among IY group of KOL tribe				
Initiation of BF	Infants *n* (%)		Young Children *n* (%)	
Within 1 hr	12 (40)		7 (23.3)	
1-24 hrs	9 (30)		16 (53.3)	
1-3 days	9 (30)		7 (23.3)	
Initiation of Complimentary Feeding				
Between 4-6 months	-		5 (16.6)	
Between 6-9 months			15 (50)	
Between 9-12 months			2 (6.6)	
After 12 months			2 (6.6)	
Not started			6 (20)	
Intake of vitamin A syrup	Yes	No	Yes	No
	-		0 (0)	30 (100)
Loose motion			3 (10)	27 (90)
ARI			3 (43)	17 (57)
Colostrum given	26 (87)	4 (13)	-	

However, this finding was not statistically significant (*P* = 0.6). The mean head circumference of Infants and young children was 38.8 ± 2.8 and 44.1 ± 1.9, respectively. Maximum proportion among infant (83%) and young children (80%) had head circumference in normal range. Although, the result was not statistically significant (*P* = 0.21). Regarding MUAC, the mean mid upper arm circumference of Infants and young children was 12.1 ± 1.5 and 13.2 ± 0.87, respectively. More than half of the infants (57%) were found to be malnourished on MUAC measurement while among young children, 30% were at risk and 13% were malnourished (*P* < 0.001). As far as feeding practices are concerned, Table 3 shows that the breastfeeding was started within 1 hr among maximum infants (40%) and approximately half of the young children (53.3%). Half of the young children had timely initiation of complimentary feeding. But none among young children received Iron and Vitamin A syrup. Only 10% of children suffered from episodes of loose motion within the

last 2 weeks whereas, 43% suffered from episode of ARI within the last 2 weeks. On the positive note, maximum infant (87%) received colostrum after birth.

Discussion

A low mean diet diversity score was reported for all the tribal groups in our study including the pregnant females. In support of our finding, a study conducted on 508 randomly selected pregnant women from southwestern Bangladesh, concluded that the overall mean diet diversity score was low at 4.28 (DDS was calculated for nine major food groups). Consumption of dairy and eggs was lower among women from low socioeconomic

status, but no significant association was found between sociodemographic characteristics and consumption of leafy vegetables.[22] Similarly, a study conducted on nutritional status of rural and tribal pregnant women of Karimnagar district, Telangana concluded that both rural and tribal pregnant women were deficient in all the nutrients except fat intake when compared to RDA, 2010.[23] Maximum pregnant and lactating females had normal BMI in our study. In contrast to this finding, a study[24] conducted on 400 pregnant women in Bangladesh, found that only 40.25% pregnant female had normal BMI.

Also, a study conducted on lactating mothers having children <1 year of age in Kolkata, reported that approximately half of them (52.4%) had undernutrition.[8] On mid upper arm circumference measurement, more than half of the infants were found to be malnourished in this current study. Also, more than one-third of the young children were either malnourished or were at risk. Ashtekar S V *et al.*[25] also mentioned in his study that scheduled tribe (ST) children had lower MUAC values than non-ST children. In the current study, early initiation of breastfeeding within one hour was noted among approximately half of the infants and young children. In contrast to our finding, Sivaraman S *et al.*[26] reported in his study that more than half of the children (59.3) were initiated breastfeeding within one hour of their birth. Surprisingly, none of the children in our study ever received iron and vitamin A syrup. This is in contrast with finding reported by Rai R K *et al.*,[27] who mentioned findings from analysis of NFHS-3 and NFHS- 4 that children living in rural areas and children belonging to schedule tribes had higher odds of receiving weekly iron supplementation.

Conclusion

With the rapidly changing profile of malnutrition in India, proclaiming decline in undernutrition. This study findings brought the widened health inequalities into the spotlight.[28] A significantly higher prevalence of malnutrition was found among infants, adolescents, and reproductive age group females. IFA/calcium supplement and vitamin A syrup intake were substantially low, which further adds a negative shade to the nutritional status of the tribe. Although different initiatives like relaxing the population norm for setting up Anganwadi centres have been taken up by the government; to raise their access to public health services. Still, the findings of the study strive for ensuring the availability of basic nutrition needs by strengthening the public distribution system. Along with it, the provision of supplementary nutrition services through ICDS needs to be scaled up on stringent mode.

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Conflicts of interest

There are no conflicts of interest.

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