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Nutritional Status, Clinico-biochemical Profile and Obstetric Outcome of Pregnant Women of Tribal Communities of Purnia District (Bihar)

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OBJECTIVE – To assess of nutritional status, clinico-biochemical parameters and obstetric outcome of pregnant women of the tribal communities of Purnia district of Bihar. **METHODS** – Thirty three tribal pregnant women of Oraon, Santhal and Munda tribes and 15 non-tribal pregnant women (controls), in their last trimester of pregnancy and in the age group of 19 to 30 years, with gravidity of one to four and partiy of zero to three were selected by random sampling from Purnia East Block, Bihar state, for study. Mean nutrient intake of the subjects was assessed by 24 hour recall method. Serum retinol, serum ferritin and blood haemoglobin levels were estimated. Placental weight, placental diameter and birth weight of neonates were recorded. Data were statistically analyzed by 't' test. **RESULT** – Results indicated a highly malnourished and severely anemic state of the subjects. Clinical parameters and obstetric outcome data of the subjects were in subnormal values, significantly inferior as compared to those of controls ($p<0.001$ to 0.1). **CONCLUSION** – Tribal women of Purnia district are exposed to high risk pregnancies due to severe malnutrition and poor antenatal care.

Key words : tribals, nutrition, community health

Introduction

Maternal nutrition forms one of the important parameters affecting the course of pregnancy and obstetric outcome. Seventy five percent of fetal growth is related to the maternal nutritional status. Maternal health not only affects the health of neonate but also has a say in the growth and development of the baby in the later years[1]. The health status of a pregnant woman can, however, be assessed accurately through clinico-biochemical investigations. Nutritional, clinical and obstetric studies on the pregnant women of a community would be of great help in improving the management of pregnancy, obstetric performance and neonatal health. This, in turn, would be conducive to the growth and development of the community. Tribal communities, being mostly a socially isolated lot, would be benefited much from such studies. We studied the nutritional status, clinico-biochemical parameters like serum retinol, serum ferritin and blood haemoglobin levels and the obstetric outcome viz., placental weight, placental diameter and birth weight of neonates of the pregnant women of the tribal communities of Purnia East Block of Purnia district of Bihar.

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Materials and Methods

Randomly selected tribal pregnant women belonging to Santhal, Oraon and Munda tribes from Purnia East block, in their last trimester, were asked to visit any of the two selected nursing homes situated in Purnia town during their pregnancy period, as well as, for delivery. Non-tribal pregnant women of the same area belonging to similar socio-economic group and duration of pregnancy were selected as controls and were asked to visit any of the same two nursing homes. Table I gives the population details of the tribals in purnia East Block.Number and basic data of the women belonging to the controls and the study group are given in Table II.

Selection of sample size of different tribes was in proportion to the size of their population in the study area and the criteria of selection was by random sampling method. 0.2% of Oraon population, 0.3% of Santhal population and 1% of Munda population were studied.

Through interview schedule and a well structured questionnaire, information about the socio-economic, nutritional and health status of the selected pregnant women was elicited. Information regarding the food intake for three consecutive days was collected from respondents using 24 hour recall method. Data were collected by the method of National Nutrition Monitoring Bureau Standard. Household measures, including containers of five consecutive sizes, spoons and glasses were shown to the subjects to help them to indicate exact amount of foods consumed by them. Cooked intake was converted to its raw equivalents.

Table I : The Population details of the tribals in Purnia East Block.

Tribe	Population					Percentage of eligible population Studied
	Total	Male	Female	Unmarried and Infertile Women	Fertile women	
Oraon	9250	5025	4225	2747	1478	1.01
Santhal	4269	2319	1950	1209	741	1.35
Munda	356	199	157	99	58	13.79
Others	356	192	164	103	61	-
All Tribes	14231	7735	6496	4158	2338	1.41
	(100%)	(54%)	(46%)	(29%)	(17%)	(1.41%)

Table II : Basic Data

	Groups	Number	Mean Age (Years)	Mean Gravidity
I	Controls	15	23.8 ± 3,53	2.6 ± 0.99
II	Oraons	15	23.2 ± 2.86	2.3 ± 1.19
III	Santhals	10	24.1 ± 3.72	2.3 ± 0.95
IV	Mundas	8	23.6 ± 3.28	2.6 ± 0.90

Table III – Mean Nutrient Intake of the Selected Pregnant Tribal Women of Purnia East Block.

Nutrient	RDA (ICMR) Moderate Activity	Control		Oraon		Santhal		Munda	
		Actual Intake	Percent excess or deficit	Actual Intake	Percent excess or deficit	Actual Intake	Percent excess or deficit	Actual Intake	Percent excess or deficit
Energy (K Cal)	2525	1920.35	-23.95	1850.62	-26.71	1896.71	-24.88	1750.42	-30.67
Protein (gm)	65	53.64	-17.48	50.41	-22.45	52.32	-19.54	46.28	-28.80
Fat (gm)	30	25.28	-15.73	24.50	-18.33	23.90	-20.33	18.60	-38.00
Calcium (mg)	1000	548.16	-45.18	315.3	-68.47[a]	464.28	-53.57	539.24	-46.07
Iron (mg)	38	32.82	-16.26	22.12	-41.78[a]	29.30	-22.89	26.82	-29.42
Thiamin (mg)	1.3	1.9	46.15	3.12	+140.00	3.75	+188.46	2.80	+115.38
Riboflavin (mg)	1.5	1.16	-22.67	1.12	-25.33	1.15	-23.33	1.10	-26.66
Niacin (mg)	16	4.31	-73.06	3.92	-75.50	3.85	-75.93	3.2	-77.37
Ascorbic acid (mg)	40	31.40	-21.50	12.25	-69.37[a]	48.56	+21.40	54.52	+36.30
β-Carotene (ug)	3600	2631.52	-26.90	475.56	-86.79[a]	1920.41	-46.65	2425.45	-32.63

a – Usually Oraon pregnant women do not consume green leafy vegetables during their last trimester of pregnancy.

Table IV- Assessment of Severity of Anemia in Pregnant Tribal Women of Purnia East Block

Severity Of Anemia	Cut-off Level of Hemoglobin	Groups	Mean Hemoglobin Level	Type of Anemia
		Control (N=15)	8.59 ± 2.8	Moderate
Mild	10g dl and above but below 11g/dl	Oraon (N=15)	6.81 ± 0.55	Severe
Moderate	7g dl and above but below 10g, dl	Santhal (N=10)	6.76 ± 0.25	Severe
Severe	Below 7g dl	Munda (N=8)	6.55 ± 0.29	Severe

Table V – Serum Retinol and Serum Ferritin Levels and Blood Hemoglobin Profile of the Subjects and Controls.

Groups	Parameters			't' Value			
	Serum Retinol (µg/dl)	Serum Ferritin (µg/L)	Blood Hemoglobin	Comparison between	Serum Retinol	Serum Ferritin	Blood Hemoglobin
I. Control (N=15)	21.93 + 0.84	80.78 ± 5.16	8.59 ± 2.8				
II. Oraon (N=15)	17.38 + 1.06	46.88 ± 7.03	6.81 ± 0.55	I VS. II	13.06[a]	15.30[a]	2.44[b]
III. Santhal (N=10)	12.68 + 0.44	39.45 ± 0.98	6.76 ± 0.25	I VS. III	31.73[a]	24.87[a]	2.06[b]
IV. Munda (N=8)	12.26 + 0.48	32.30 ± 1.88	6.55 ± 0.29	I VS. IV	29.79[a]	25.51[a]	2.03[c]

a : Significant at 0.1% Level **b** : Significant at 5% Level **c** : Significant at 10% Level

Table VI : Mean Birth Weight and Placental Weight and Diameter of the Subjects and Controls.

Parameters	Control (N=15) I	Oraon (N=15) II	Santhal (N=10) III	Munda (N=8) IV	Comparison between	't' Value	Significance level
Birth Weight (Kg)	2.85 + 0.06	2.45 + 0.20	2.24 ± 0.12	2.16±0.16	I VS. II I VS. III I VS. IV	8 20.33 17.25	Significant at at 0.1% level
Placental Weight (gm)	484.26 + 5.01	435.75 ± 2.63	430.39 ± 3.43	424.37±1.71	I VS. II I VS. III I VS. IV	33.22 29.65 32.73	Signtficant at at 0.1% Level
Placental Diameter (cm)	16.53 + 0.53	15.34 ± 0.27	14.17 ± 1.03	14.06 ±0.35	I VS. II I VS. III I VS. IV	7.60 7.53 11.85	Significantat at 0.1% level

Nutrients were calculated from the food consumed by the study group using food composition table from the standard reference[2]. The results were compared with Recommended Dietary Allowances (RDA) given by ICMR.

Serum retinol, serum ferritin and blood haemoglobin profile of the subjecs and controls were recorded just prior to their delivery. Blood haemoglobin and serum retinol were estimated by cynmethemoglobin method and spectrophotometric method respectively, adopting standard procedures[3]. Serum ferritin was estimated by ELISA method. Obstetric performance and pregnancy outcome viz., birth weight of the neonate, placental weight and placental diameter were also recorded.

Results and Discussion

Data on the mean nutrient intake, severity of anemia, clinico-biochemical parameters and obstetric outcome of study subjects and controls are given in Tables III, IV V and VI. A study of mean nutrient intake (Table III) of the pregnant tribal women reveals a generally malnourished state. The most important minerals during pregnancy are iron and calcium. Both of these are highly deficient, with calcium deficit revealing an alarming picture of as high as 68.47% (Table III). This would reflect in a poor growth and likely congenital disorder of the fetus. This poor mineral nutrition coupled with a low energy as well as protein content would increase the miscarriage risk. In fact, miscarriages are commonly reported among the tribal population in the district. In our survey also, we could confirm this. It seems that the dietary intake is not increased during pregnancy as per the increased requirement at this stage. Added to this is another factor of food fads. The Oraon women for example, are not allowed to consume green leafy vegetables during the last trimester of pregnancy. Their belief is that this would increase wo in infestation. This food fad might also be a reason for general deficiency of ascorbic acid among Oraon pregnant women in last trimester. It is seen that this food fad is not prevalent among Santhals and Mundas. These tribes have positive value of ascorbic acid intake which might also be coming from a habitual large-scale consumption of drumstick leaves. A uniform deficiency of riboflavin (B_2), niacin (B_3) and β-carotene was also found in all the tribal women. Only thiamin (B_1) content had a good positive value. Relatively large quantity of cereal consumption seems to contribute to the thiamin nutrition. In fact, tribal foods have been reported to be mostly rich in cereal[4].

Energy, protein and fat were highly deficient in the women of all the three tribes. This reflects in a poor general health of these pregnant women. Anemia is commonly seen during pregnancy, because, requirement of iron increases during this period. The additional iron requirement for the entire period of pregnancy to compenrate increased maternal blood volume, high hemoglobin levels of infants and loss of maternal iron through skin and sweat is 810 mg[5]. To avoid iron deficiency, a women should enter pregnancy with a store of 300mg of iron. Table III presents a gloomy picture in this matter. Subjects of all the three tribes were found to suffer from severe anemia presenting an alarming picture.

Clinico-biochemical parameters form important markers of a safe pregnancy. Serum retinol, serum ferritin and blood hemoglobin levels are important parameters. As seen from Table V the mean retinol values of the subjects were very much lower in comparison to those of the controls ($p<0.001$). The controls who were from among similar socio-economic status to the subjects but nearer to the urban areas, also showed low retinol content (21.93 ug/dl). But, much lower values in case of study subjects reveal that besides economic factor, the social isolation factor is also operating. Serum retinol has, in fact, a significant relationship with biochemical indicators of iron. Vitamin A exerts its action on the uptake and release of iron in the liver uptake of iron by the bone marrow and on synthesis of hemoglobin[6].

Serum ferritin levels were also quite low in all the subjects indicating a low iron deposit in the body. Serum ferritin is, in fact, an important biochemical indicator of iron status and is also a reflector of the total maternal hemoglobin mass. Compared to controls, the serum ferritin level of the subjects is significantly low ($p<0.001$). The hemoglobin levels of the study subjects have also been found to be significantly low ($p<0.05$) compared to those of the controls. Rangnekar et al report that 40% to 70% of the Indian pregnant women have hemoglobin level less than 10g/dl causing a number of pregnancy complications. A low retinol level of the subjects is perhaps one of the reasons for their low hemoglobin levels. Vitamin A supplementation to the pregnant women has been observed to significantly increase the hemoglobin levels[5].

The neonatal parameters are complimentary to the status of pregnancy. Table VI indicates that the neonates of the subjects of none of the three tribes are up to the mark. The birth weight is quite low, in the range of 2.16 to 2.45 kg. Compared to controls all the parameters viz., birth weight, the placental weight and placental diameter of the tribals were found to have lower values ($p<0.001$). These lower values of neonates would affect their health and growth. The birth weight in fact, is the single most important predictor of infant survival[6]. The neonatal and post-neonatal mortality actually increases exponentially

with decreasing birth weight. Thus, a low birth weight, caused by poor nutritional status of the mother, is perhaps an important reason for the prevalence of a higher infant mortality among the tribal communities.

Thus, the problem of malnutrition is quite severe among the tribal pregnant women of Purnia district of Bihar. Certain food fads are also prevalent. Anemia is a common feature at all stages of pregnancy in all the tribes. The clinico-biochemical parameters, marking the safety of pregnancy, are also in subnormal values. All these affect the neonate's health. As such, it is necessary to educate the tribal women about nutritional requirements and antenatal care during pregnancy. Maternal and child health centers should be established in the tribal habitats. All efforts should be made to improve their economic status and alleviate their social isolation.

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