

A Cross-Sectional Study to Assess Nutritional Profile of Pregnant Women Diagnosed with Hypothyroidism

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ABSTRACT

Thyroid is an important endocrine gland, during first trimester enlargement of gland occurs and also increases the requirements of iodine. During this period insufficient intake of iodine results in hypothyroidism. As per recent research, prevalence of hypothyroidism has been increased in pregnant women. So, the cross-sectional study was conducted to assess nutritional profile of pregnant women diagnosed with hypothyroidism. Women were enrolled in the study as per eligibility criteria. Demographic information, biochemical parameters, dietary questions, 24-hour dietary recall and food frequency of pregnant women were evaluated. Our study resulted that pregnant woman were micronutrient deficient due to inadequate of nutrients in their diet. Also, this study supported that iron deficiency is associated with iodine deficiency which causes hypothyroidism.

Keyword: Pregnant women, Nutritional status, Dietary intake, Hypothyroidism, Anemia.

INTRODUCTION

Thyroid is a crucial endocrine gland that governs the rate at which metabolism takes place in the cells. Thyroid hormones are not for immediate functions of life but their absence affects mental and growth improvements in infants ^[1]. During first trimester of pregnancy gland increases its size by 10% and thyroxin and tri iodothyronine increases half of its production due to which iodine requirements increases ^[2]. Inadequate iodine intake during this phase develops iodine deficiency which causes hypothyroidism. Thyroid disorder has huge impact on both mother and fetus. T3 and T4 are transported from placenta to fetus for development of brain and nervous system during pregnancy ^[3]. Most common complications in maternal hypothyroidism causes preeclampsia, abruption placenta,

preterm labor also affects fetal outcomes such as prematurity, low birth weight, stillbirth, and perinatal death.

According to the study iodine supplements are given during first trimester which help in developing fetal brain, supplements given during third trimester cannot treat the brain damage⁴. Iodine Deficiency Disorder cannot be healed but can be prevented. ICMR recommended to consume 250 µg/day for Indian pregnant women. Iodine Deficiency Disorder is a major public health issue in almost 46 countries, in which India has the largest number deficient children ^[5]. Indian reports say that prevalence of hypothyroidism ranges from 4.8% to 11% ^[6-7]. In India there is high prevalence of neonatal hypothyroidism about 4.2%. Various studies have reported that pregnant women are

more prevalent towards micronutrients deficiencies and protein energy malnutrition.^[8-9]. Therefore, this study was planned to assess nutritional profile of pregnant women diagnosed with hypothyroidism.

Objective of the study

1. To assess the nutritional profile by 24-hour dietary recall and food frequency table among pregnant females in first, second and third trimesters detected with hypothyroidism.
2. To study biomedical parameters of pregnant women in first, second and third trimesters detected with hypothyroidism.

MATERIALS AND METHODS

A cross-sectional study was conducted in Jawaharlal Nehru Medical College, KAHER, Belagavi. Pregnant women diagnosed with hypothyroidism from Dept. of Obstetrics & Gynaecology of Dr. Prabhakar Kore Hospital and MRC also PHCs and UHCs attached to J.N. Medical College were enrolled in the study as per eligibility criteria from the period of February 2021 to April 2021. A total of 36 pregnant women were recruited in the study. Data was collected using predesigned structured questionnaire which included demographic information, biochemical parameters, dietary questions, 24-hour dietary recall and food frequency. Ethical clearance and informed consent were obtained before the study was conducted.

Inclusion criteria: All Primi and Multigravida pregnant women with singleton pregnancy registered for Antenatal Checkups and diagnosed with hypothyroidism and were in either first, second or third Trimester of Pregnancy.

Exclusion Criteria: Pregnant women with pre-gestational hypothyroidism, multiple pregnancies and Gestational trophoblastic disease were excluded.

Parameters evaluated:

1. **Demographic Data:** Age in years was noted of nearest completed year. Occupation of pregnant women was evaluated.
2. **Anthropometry parameters:** Height was measured by Commercial stadiometer to the nearest 0.5 cm and weight was recorded in kilograms by Digital scale with an accuracy of +100gm with this BMI was calculated using kg/m^2 formula.
3. **Maternal history:** Pregnant women were briefed about their trimester, age when they got married, pre-pregnancy weight, thyroid detected, medications taken during pregnancy.
4. **Biochemical Parameters:**
 - **TSH levels:** TSH levels were recorded by ultra-sensitive chemiluminescence serum method.
 - **Blood glucose levels:** Blood glucose levels were recorded using Random Blood Sugar (RBS) method and DIPSI (Diabetes in pregnancy study group of India) method.
 - **Hemoglobin:** hemoglobin was estimated using Shalis Hemoglobinometer.
5. **Nutritional Profile:** Nutritional profile was assessed by:
 - 24-hour dietary recall: Pregnant women were asked about their 24-hour diet, which included early morning meal, breakfast, lunch, evening snacks, dinner and bedtime.
 - Food frequency table: This table had list of all five food groups with iodine rich foods from which we found the frequency of each food group consumed by pregnant women.

Methodology for data analysed: Data was entered in Microsoft Excel 2019, subsequently it was analysed using SPSS software version-22 and presented in the form of tables and bar graphs. Chi-square test was used for finding association between Nutritional profile and demographic variables.

RESULTS

Maternal health is complex, many physiological, biochemical and hormonal changes occur in body which requires more nutrients and strength. Nutritional status of pregnant women is also influenced by her genetic, socioeconomic, and environmental factors, as well as infections and environmental conditions, all of which can impair foetal growth. Total 36 pregnant

women were taken in the study. Socioeconomic profile was evaluated, in which majority (44.4%) of pregnant women were between the age group 26-30 years. About 38% were in pre-obese category as per BMI classification of obesity, 27% had normal BMI, 22% were obese class I, 8% were obesity class II while only 2% were underweight. 86% of the subjects were housewife. [Table No.1]

Table No 1. Socio-demographic profile:

Socio-demographic data		Frequency	Percentage
Age	<= 25 (Group1)	15	41.7%
	26 – 30 (Group2)	16	44.4%
	31 – 35 (Group3)	3	8.3%
	36+ (Group4)	2	5.6%
BMI*	Underweight (<18.5kg/m ²)	1	2.78%
	Normal weight (18.5-22.9 kg/m ²)	10	27.78%
	Pre-obesity (23.0-24.9 kg/m ²)	14	38.89%
	Obesity class I (25.0-29.9 Kg/m ²)	8	22.22%
	Obesity class II (<30.0 Kg/m ²)	3	8.33%
Occupation	Businesswoman	2	5.6%
	Housewife	31	86.1%
	KLE hospital clerk	1	2.8%
	School teacher	1	2.8%
	Staff nurse KLE	1	2.8%
Trimester	First trimester	4	11.1%
	Second trimester	13	36.1%
	Third trimester	19	52.8%
Age of marriage	<20years	2	5.6%
	20 -29 years	32	94.4%

* BMI given by WHO Consultative group for Asians cut-off levels (WHO/IASO/IOTF 2000)^[10].

Table No. 2 Assessment of Average nutrient intake by 24-hour Dietary Recall

Nutrients	Mean ± SD	Minimum	Maximum
Energy (Kcal)	1277.17 ± 282.18 (63.54%)	481.30	2010.00
Protein (gm)	43.69 ± 8.78 (71.04%)	22.52	68.60
Carbohydrates (gm)	188.62 ± 39.26	110.30	282.40
Fats (gm)	30.44 ± 12.28	10.40	62.00
Iron (mg)	19.87 ± 1.57 (73.59%)	15.27	24.40

Figures in parenthesis indicates per cent of RDA 2020

Table No. 2 reveals that subject participants had very less calorie intake as compared with recommended dietary allowance. Mean nutrient intake of pregnant women was 1277 kcal of energy, 43.69g of protein, 188g of carbohydrates, 30.44g of fats and 19.87mg of iron in their daily diet.

Food frequency of pregnant women resulted that, cereals were the major food groups consumed on daily basis. Frequency of leafy vegetables consumption was daily (19.4%) and alternate days (44.4%). Non-vegetarian foods like lean meat, red meat, eggs, and fish were prefer once or twice a week (36.11%). Iodine rich foods like cabbage, cauliflower, eggs, green leafy

vegetables, onions, milk and milk products were more consumed on alternate days (38.88%).

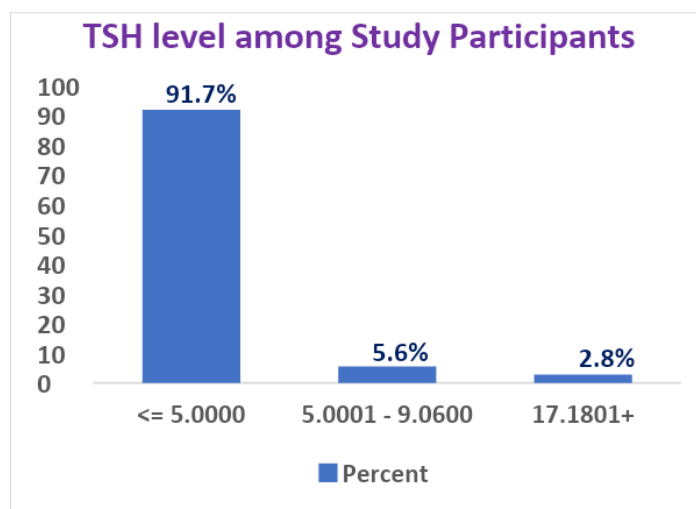
Table no. 3. Biochemical Parameters of enrolled pregnant women

Bio-Chemical		Frequency	Percent
TSH level (mU/L)	<= 5.0000	33	91.7%
	5.0001 - 9.0600	2	5.6%
	17.1801+	1	2.8%
Blood Glucose Level (mg/dl)	<= 90.00	11	30.6%
	90.01 - 110.00	15	41.7%
	110.01 - 130.00	9	25.0%
	130.01+	1	2.8%
Anaemia (g/dl)	Normal	19	52.8%
	Mild	6	16.7%
	Moderate	10	27.8%
	Severe	1	2.8%

TSH was estimated by sensitive chemiluminescence serum method 91.7%

had ≤ 5.0 mU/L of TSH level, 5.6% had 5.0-9.0 mU/L and 2.8% had 17.1 mU/L TSH level. 30.6% pregnant women had blood glucose level less or equal to 90 mg/dl, 41.7% were in between 90-110 mg/dl and 25% were in between 110.1-130 mg/dl and

one pregnant woman had more than 130 mg/dl (2.8%). 52% of them had normal haemoglobin, 16.7% were mild anaemic, (27.8%) were moderate anaemic and (2.8%) were severely anaemic. [Table No.3]



Graph No. 1 Distribution of study population as per TSH level

Table No. 6 Mean TSH levels

TSH Levels		Values	Number	%
First trimester	Normal	0.6-3.4 mU/L	3	8.33%
	Low	< 0.6 mU/L	0	0.00%
	Hypothyroidism	>3.4 mU/L	1	2.78%
Second trimester	Normal	0.37-3.6 mU/L	7	19.44%
	Low	< 0.3 mU/L	0	0.00%
	Hypothyroidism	>3.6 mU/L	6	16.67%
Third trimester	Normal	0.38-4.0 mU/L	17	47.22%
	Low	< 0.3 mU/L	0	0.00%
	Hypothyroidism	>4.0 mU/L	2	5.56%

Cut off of TSH level^[11]

Mean TSH level of pregnant were, in first trimester 2.78% had hypothyroidism, in second trimester 16.67% of them had hypothyroidism and in third trimester 5.56% had hypothyroidism.

DISCUSSION

The present study was designed to assess the Nutritional profile of pregnant women from all three trimesters who were diagnosed with hypothyroidism, with the help of questionnaire socio demographic information was obtained in which majority of them were pre-obese (38.8%). Similar cross-sectional study conducted in Belagavi showed that 51.5% pregnant women had normal BMI^[12]. Another related study was conducted in Karnataka which reported that majority study participants (71.79%) had

normal BMI^[13]. High BMI is linked with increased risk health factors during pregnancy, which affects both maternal and fetal health. Excessive weight gain burdens the strain on organs and increases the incidence to toxemia.

Undernutrition pregnant women have adverse effects on their fetal outcomes. So, to assess nutritional status of pregnant women our study included food frequency table and 24-hour dietary recall which showed that pregnant women had inadequate energy, protein, carbohydrate and fat in their diet. Previous study conducted in Belagavi showed up similar results that pregnant woman consumed low dietary intake than RDA (ICMR)^[12]. Similar study in Karnataka reported that 80.34% & 90.60% of study participants were not

consuming adequate energy and protein respectively. None of the subjects consumed energy more than 2500 kcal^[13]. Rural pregnant women of Haryana state were assessed on their nutritional profile which reported that women consumed low energy and protein compared with (ICMR 1989), women had inadequate cereals and pulses which are main source of energy and protein^[14]. Low dietary intake during pregnancy affects the fetal growth and development, studies from NIN have indicated that maternal lean body mass is most vital determinant of infant's birth weight.

Optimum nutrition during pregnancy needs adequate amount of macro and micro nutrients to have a positive pregnancy outcome. Poor nutritional status results in micronutrient deficiencies mainly iron and iodine deficiency. In the present study we recorded haemoglobin levels of pregnant women which showed 11.11% were mild iron deficient, 16.67% were moderate and 2.78% were severe anaemic. A similar study conducted in Vadodara, Gujarat reported that majority of the study population had low haemoglobin levels in which 66.4% were mild iron deficient, 22.7% were moderate and 2.73% were severely anaemic^[15].

Another study conducted in Delhi showed that 78.8% of pregnant women were suffering from iron deficiency in which 29% were mild iron deficiency, 48% were moderate and 2% were severely anaemic^[9]. Supplementation of iron and iron rich diets can help to overcome the deficiency. Iron is associated with iodine deficiency which often results hypothyroidism. Studies have showed that low haemoglobin levels predict higher TSH and lower TT4 concentrations in iodine deficiency^[16].

Mean TSH values of the study participants were higher than normal values in all first, second and third trimesters, >3.4mU/L, >3.6mU/L, >4.0mU/L respectively. Similar study conducted in India found that 13.13% of pregnant women had hypothyroidism whose mean TSH level during first trimester (3.42 ± 8.85 mU/L),

second trimester (3.20 ± 6.54 mU/L) and third trimester (2.97 ± 2.71 mU/L), which were higher than American Thyroid Association criteria^[17]. Another similar study was conducted in Delhi of first trimester pregnant women which showed 14.3% of them had more TSH value than their cut-off value which was 4.5 μ IU/L^[17]. Further this study reports that hypothyroidism has significant relation with pregnancy which has adverse maternal complications and fetal complications include low body weight, fetal death, fetal goitre and decreased IQ. Iodine deficiency in mother can lead to abortion, still births, congenital anomalies, increased perinatal mortality, cretinism and psychomotor defects.

Blood glucose level in the present study population was ranging in between 90-130mg/dl which is considered as normal blood glucose level. Pregnant women having blood glucose level above 140mg/dl is considered as gestational diabetes mellitus (GDM)^[18]. Diabetes during pregnancy increases the risk of adverse maternal, fetal and neonatal outcomes. Women are more likely to have preterm births, premature rupture of membranes, babies are born with high weights which is difficult during delivery. There is no such treatment for diabetic pregnant women for reduces birth weight of babies or reduced impact on pregnancy outcome^[19-21].

CONCLUSION

1. The Carbohydrates, Protein, Fats, Iron and Energy consumption was less in our study population as compare to RDA given by ICMR in pregnant women.
2. About 2.78% had hypothyroidism in second trimester and 16.67% of them had hypothyroidism in third trimester.
3. About 52% of study population has low levels of hemoglobin

Limitation

We couldn't include a bigger group of study population due to COVID Pandemic

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Ethical Approval: Approved

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