Study of Nutrition and Health Status of Pregnant Women in a Tertiary Care Teaching Hospital

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Research Article

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Abstract

Introduction: Pregnancy is a phase where nutritional intake by pregnant women has a crucial role in foetal growth and development. The health status of pregnant women is determined by the presence or absence of disease conditions like Gestational diabetes mellitus (GDM) pre-eclampsia, and thyroid disorders. A study on the nutrition and health status of pregnant women can furnish the necessary information to improve their nutritional intake and health status. **Objective**: To study the nutrition and health status of pregnant women in a tertiary care teaching hospital. **Methodology**: A prospective observational study was carried out among 151 pregnant women of the last trimester, admitted in the OBG department from October 2019 to March 2020. The required data was collected using a data entry form and questionnaire. **Results**: Most of the study participants were in the age group of 20-29 years (76%), and 53% of them were illiterate and 34% unemployed. Nutritional intake by study participants was lower than the recommended dietary allowance (RDA) suggested values. The anaemic population are more prone to pre-term pregnancies, giving birth to underweight new-borns, underweight and undernourished participants are more prone to anaemia, and pregnant women supplemented with iron are less prone to anaemia. Study participants were affected by pre-eclampsia, GDM and thyroid disorders by 17%, 11%, and 27%, respectively. **Conclusion**: Illiteracy and unemployment lead to widespread undernourishment, which resulted in underweight new-borns, decreased Body Mass Index (BMI) and increased anaemia in pregnant women. The health status of pregnant women is often affected by co-morbid conditions like preeclampsia, GDM, and thyroid disorder.

Key words: Gestational diabetes mellitus, health status, maternal anaemia, nutritional study, pregnancy, pre-eclampsia

Introduction

Pregnancy, also known as gestation, is a phase in the life of women, where nutritional intake and other co-morbid disease conditions are of special concern. Nutrition is a basic human need and pre-requisite to a healthy life. A proper diet is essential from the very early stages of life for proper growth, development and to remain active.[1] Maternal nutrition and health are considered as the most important regulator of human foetal growth.[2] Pregnant women who are well-nourished and not affected by any disease condition are likely to have a complication-free delivery and to give birth to healthy new-borns.

The biological support which a child receives from its mother in the course of its development and growth through pregnancy and lactation depends on the kind of nourishment a mother received during her pregnancy. However, if women are not well nourished, they are more likely to give birth to weak babies, resulting in a high infant mortality rate. At birth, foetal weight is accepted as the single parameter that is directly related to the health and nutrition of the mother, and on the other hand, it is an important determinant of the chances of the new-born to survive and experience healthy growth and development.[3]

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Maternal nutrition must include a good diet and other micronutrient supplementation. One of the micronutrients of special importance is iron. Maternal anaemia during pregnancy, especially in the second trimester, influences postnatal infant growth and is associated with an increased risk for low birth weight and preterm birth.[4] Thus, it is essential that pregnant women should take additional micronutrients, especially iron.

Pregnancy is a special physiological condition in which due care must be given to the health status of the pregnant women. Normally, the health status of pregnant women is determined by the presence of other co-morbid disease conditions, which can later lead to many complications in pregnancy, and even affect the health status of the newborn. The major co-morbid conditions which can occur during the pregnancy period are anaemia, gestational diabetes mellitus, pre-eclampsia, and thyroid disorders.

The above facts pinpoint the need for a study on the nutrition and health status of pregnant women to facilitate the development of new dietary plans for them and improve their health status. The current study focuses on the nutrition and iron supplement intake of pregnant women; the study also relates the nutritional status, BMI, and iron supplement intake of the participants to their anaemic status. This study aims to establish a relationship between anaemia of pregnant women to the weight of their newborn and the term of their delivery.

Although there is vast literature available on pregnant and lactating women, the professionals that care for them often lack adequate knowledge about their nutritional requirements and the chance for the presence of other disease conditions. This study aims to offer updated information on the nutrition and health status of pregnant women to facilitate the development of dietary plans and awareness programs by conducting the current study in a tertiary care teaching hospital.

Materials and Methods
Study design and setting
The prospective observational study was conducted for six months among the pregnant women of the last trimester admitted in the OBG Department of Navodaya Medical College Hospital and Research Centre, Raichur. Data such as patient demographics, past medical, and medication history, allergy status, laboratory data, anthropometric details, and body weight of the newborn was collected by using a specially designed data entry form and the data on the nutrients and iron supplement intake was collected using a modified data collection questionnaire.

Subjects
Inclusion criteria: Pregnant women of the last trimester admitted to the OBG department of NMCH and RC during the study period.

Exclusion criteria: Pregnant women who are not willing to participate in the study.

Sample size determination
For determination of sample size, many survey studies conducted in Raichur was collected, and the total number of deliveries that took place in private and aided hospitals were determined. This value was used to obtain the p-value. Later, this p-value was used to calculate the sample size at a 5% error.

Ethical clearance
The ethical approval to conduct the study was obtained from the Institutional Ethical Committee of Navodaya Medical College Hospital and Research Centre.

Materials used
Data collection form: A data entry format for incorporating in-patient details was designed. The format contains provisions to enter the details such as patient's name, IP number, age, medical and medication history, diagnosis, lab values, anthropometric data, body weight of newborn, co-morbid conditions, and medications.

Questionnaire: A modified data entry questionnaire that need not be validated was used to collect data on the nutritional and iron supplement intake of pregnant women. Data on occupational status and literacy was also collected using the questionnaire.

Statistical analysis
The nutritional data was quantitated using WHO Nutri Survey 2007 calculator. The data collected was analysed and compared using Microsoft Excel

2016 with usual statistical tools like frequency, percentage, mean, and standard deviation.

Discussion

Out of the 151 pregnant women who were willing to participate in the study, most of them were in the age group of 20-29 years (76%), followed by 18% of the participants in the age group of 30 – 39 years. The results were similar to the study conducted by Mudhaliar M R et al.2 and Verma S et al.3 On categorizing the study population based on occupation, it was evident that more than half the study population, i.e., around 53% were housewives, 27% of the participants were salaried, and 20% were self-employed. From this, it was understood that most of the unemployed pregnant women, could not have proper nutritional intake unless supported by the family. This was similar to the results of studies like Mudhaliar R M et al.2, Verma S et al.,3 and Woldeamanuel G G et al5. Majority of the participants, around 34.4% were illiterate followed by 19.2% who had primary education, 15.9% having upper primary education, 13.2% having matriculation, 10.6% had inter-education, 4% held a degree, and 2.6% held a higher degree. Thus, the data could conclude that most of the pregnant women were illiterate, and due to lack of knowledge and education, there were chances of decreased nutritional intake by the participants. (Table 1)

Out of the 151 participants, it was the first pregnancy of 35.8% of them, whereas 34.4% were in their second pregnancy. It was the third pregnancy of 19.2% of them and 10.6% were in their fourth or above pregnancy. The delivery status of the study participants showed that more than half the study population (56.3%) had caesarean deliveries, and 35.8% had normal deliveries. This is similar to the results from the study conducted by Mudhaliar M R et al2 which indicates that the majority of pregnant women who get admitted to the hospital, under go C-section (Table 1).

Table 1: Patient demographics (n = 151)

Sl. No.	Demographic details	Frequency	Percentage
	Age (n = 151)		
1	<20	5	3%
2	20-29	114	76%
3	30-39	27	18%
4	>40	5	3%
	Occupation status (n = 151)		
5	House Wife	80	53%
6	Salaried	41	27%
7	Self Employed	30	20%
	Literacy level (n = 151)		
8	Illiterate	52	34%
9	Primary	29	19%
10	Upper primary	24	16%
11	Matriculation	20	13%
12	PUC	16	11%
13	Degree	6	4%
14	Higher degree	4	3%
	Parity (n = 151)		
15	G1	54	36%
16	G2	52	34%
17	G3	29	19%
18	G4 and above	16	11%
	Delivery status (n = 151)		
19	Normal	54	36%
20	Caesarean	85	56%
21	Follow of failure	12	8%

More than half [76% (n=151)] of patients were found to be in the age group of 20-29 years, followed by 18% of the participants in the age group of 30-39 years. Participants who belonged to less than 20 years and more than 40 years were only 3% each. On categorizing the study population based on occupation, it was evident that more than half the study population (53%) were housewives, 27% of the participants were salaried, and 20% were self-employed. By collecting the data on the literacy level of the pregnant women, it was under stood that most of the participants were illiterate, i.e., 34.4% followed by 19.2% who had primary education, 15.9% had upper primary education, 13.2% had matriculation, 10.6% had inter education, 4% had an education of degree, and 2.6% had higher degrees. Out of the 151 participants, it was the first pregnancy of 35.8%, whereas 34.4% were in their second pregnancy,

19.2% were in their third pregnancy, and 10.6% were in their fourth and above pregnancy. Delivery status of the study participants showed that more than half the study population (56.3%) had caesarean deliveries, 35.8% had normal deliveries and 7.9% had a follow of failure.

For studying the anthropometric data of both the mother and newborn, data on the BMI of the participant and the body weight of the newborn was calculated. On assessing the BMI of the study participants, it was evident that 58.9 % of the study participants had a BMI in the normal range followed by 27.2% who were underweight and 13.9% who were overweight. This was similar to the findings of other studies like the study conducted by Mudhaliar M R et al.2, Woldeamanuel G G et al.5 and Rahman H et al.6 In the current study, it was found that 41% of the new-borns had a body weight in the normal range, and but majority (59%) of the newborns were underweight. In all the newborns, 35.8% had a body weight of 2 to 2.5 kg, 13.9% had a body weight of 1.6 to 2 kg, 9.3% had a body weight of 1.1 to 1.5 kg and none had body weight of less than 1 kg. This is similar to the results of the study by Verma S et al.3 and Pitale D L.7 The findings contradict the result by Mudhaliar M R et al2, which showed that most of the newborns were in the range of 1.6 to 2 kg. But, on taking an overall look into the results by Mudhaliar M R et al.2, it is similar to the current findings i.e., most of the participants gave birth to underweight babies (Table 2).

On assessing the BMI of the study participants, it was evident that 58.9 % of the study participants had a BMI in the range of 18.5-25 kg/cm2 (normal range), followed by 27.2% who had a BMI below 18.5 kg/cm2 (underweight), and 13.9% with a BMI more than 25 kg/cm2 (over weight). In the current study, it was found that 41% of the newborns had a body weight of more than 2.5 kg, i.e., in the normal range and but majority (59%) of the newborns were underweight, i.e., less than 2.5 kg. Further, the underweight newborns were classified as less than 1 kg, 1.1 to 1.5 kg, 1.6 to 2 kg and 2 to 2.5 kg. In all the newborns 35.8% had a body weight of 2 to 2.5 kg, 13.9% had body weight of 1.6 to 2 kg, 9.3% had body weight of 1.1 to 1.5 kg and 0% had a body weight less than 1 kg.

On analysing the collected data, it was observed that 64.2% of the study participants were anaemic and only 35.8% of the total population was not anaemic. This result was similar to that found by the studies by Mudhaliar M R et al.2, Rahman H et al.6 and Joshi P G et al.8 From this data it is evident that most of the study participants were anaemic, the possible reason for the anaemic condition of most of the study participants is the lack of necessary nutritional intake by them. This can also be due to the lack of iron and folic acid supplementation taken by them. On evaluating the Hb of the study participants, it was found that 33.1% of the study participants were mildly anaemic, 19.2% were moderately anaemic, 11.9% were severely anaemic and none were very severely anaemic. Maternal anaemia, if left untreated can later lead to complications in delivery and decreased birth weight of the newborn (Table 3).

Table 2: Anthropometric data (n=151)

Sl. No.	Anthropometric data	Frequency	Percentage
BMI of pregnant women			
1	<18.5	41	27%
2	18.5–25	89	59%
3	>25	21	14%
Body weight of newborn			
1	<1 kg	0	0%
2	1.1–1.5 kg	14	9%
3	1.6–2.0 kg	21	14%
4	2.0–2.5 kg	54	36%
5	>2.5 kg	62	41%

Table 3: Anaemic status and Hb levels of the study participants (n=151)

Sl. No.	Anaemic status	Hb levels	Frequency	Percentage
1	Anaemic (64%)	Mild anaemic (10-11.9)	50	33%
2		Moderate anaemic (7-10)	29	19%

3	Anaemic (64%)	Severe anaemic (<7)	18	12%
4		Very severe anaemic (<4)	0	0%
5	Non-anaemic (36%)	Non anaemic (>12)	54	36%

64.2% of the study participants were anaemic and only 35.8% of the total population was not anaemic. The anaemic patients were further divided into mild anaemic, moderately anaemic, severely anaemic, very severely anaemic. On evaluating the Hb values it was found that 33.1% of the study participants were mildly anaemic, 19.2% were moderately anaemic, 11.9% were severely anaemic and 0% were very severely anaemic.

Average nutritional intake by study participants was compared to the

RDA approved normal nutritional requirement per day for a pregnant woman. It was found that the nutritional requirement by the study participants according to RDA was not met. The caloric requirement according to RDA is 2100 Kcal, but in the study participants, it was found to be reduced to 1785.2 ± 275.8 Kcal. The required protein requirement is 80 gm as per RDA and in the current study, it was found to be 61.2 ± 6.4 gm. The study participants were further classified as under-nourished and well-nourished based on the caloric intake. 58.3% of the study participants were undernourished and 41.2 % were well nourished. These findings are similar to the results of the study by Mudhaliar M R et al.[2], Verma S et al.[3] and Adikari AMNT et al.[9] This under-nourishment has led to the increased anaemic percentage in the study participants, reduced birth weight of the newborns, and this wide spread under-nourishment may have also led to the increased use of C-section in majority of the study participants. (Table 4).

Table 4: Nutritional status of the study participants (n=151)*

Sl No	Nutritional intake per day	RDA normal values per day	Average nutritional intake by study participants± SD
1	Calories	2100 Kcal	1785.2 ± 275.8 Kcal
2	Protein	80 g	61.2 ± 6.4 g
3	Calcium	1300 mg	773 ± 4.5 mg
4	Magnesium	450 mg	375 ± 7.8 mg
5	Iron	18 mg	11.3 ± 3.1 mg
6	Zinc	15 mg	9.7 ± 2.8 mg
7	Iodine	150 mcg	109 ± 7.8 mcg
8	Vit A	8000 IU	6127 ± 5.7 IU
9	Thiamine	1.7 mg	1.09 ± 0.3 mg
10	Riboflavin	2 mg	1.1 ± 0.8 mg
11	Niacin	20 mg	17 ± 3 mg
12	Vit B6	2 mg	1.01 ± 0.3 mg
13	Vit B12	8 mcg	4.2 ± 0.9 mcg
14	Biotin	300 mcg	221 ± 0.9 mcg
15	Vit C	60 mg	54 ± 9.2 mg
16	Folic acid	800 mcg	321.2 ± 51.1 mcg
Sl No	Nutritional status(n=151)	Frequency	Percentage
1	Under nourished	88	58%
2	Well nourished	63	42%

Comparing the average nutritional intake by study participants and the RDA approved normal nutritional requirement per day for a pregnant woman, it was found that the nutritional requirement by the study participants according to RDA was not met. The caloric requirement according to RDA is 2100 Kcal, but in our study participants it was found to be reduced to 1785.2 ± 275.8 Kcal. The required protein requirement is 80 gm as per RDA, and in the current study it was found to be 61.2 ± 6.4 g. All the other nutrients which were taken by the study participants were less than the suggested values by RDA and 58% of the study participants were undernourished and 42% were well nourished.

The relationship between the anaemic status of the study participants and other factors of the pregnancy like the term of pregnancy, BMI of the study participants, body weight of the newborn, nutritional status of pregnant women and iron supplementation in-take by them were tried to establish through this study. Anaemia and its association with other factors showed that the anaemic population are more prone to preterm pregnancies, anaemic pregnant women have greater chances of giving birth to underweight new-borns (Table 5). Undernourished pregnant women are more prone to anaemia. Study participants who have a BMI less than 18.5 kg/cm2 (underweight) are more prone to anaemia, and pregnant women supplemented with iron are less prone to anaemia (Table 6).

Table 5: Anaemia and its influence on other factors. *

Sl. No.	Anaemic status	Term of pregnancy	Percentage	Body weight of newborn	Percentage
1	Anaemic (n=97)	Pre term Full term Post term	47% 39% 14%	< 2.5 kg	70%
				≥ 2.5 kg	30%
2	Non-anaemic (n=54)	Pre term Full term Post term	32% 46% 22%	< 2.5 kg	39%
				≥ 2.5 kg	61%

Out of the 97 of the anaemic study participants 47%, 39%, and 14% had pre, full, and post-term pregnancies, respectively. In the 54 non-anaemic population 32%, 46%, and 22% had pre, full, and post term pregnancies, respectively.

Table 6: Factors influencing anaemic status in pregnancy.*

Sl. No.	Nutrition status	Anaemic	Non anaemic
1	Under nourished (n = 88)	90%	10%
2	Well nourished (n = 63)	29%	71%
Sl. No.	BMI		
1	<18.5 kg/cm² (n = 41)	78%	22%
2	18.5-25 kg/cm² (n = 89)	64%	36%
3	>25 kg/cm² (n = 21)	38%	62%
Sl. No.	Iron supplements		
1	Yes (n = 126)	61%	39%
2	No (n = 25)	80%	20%

In the total undernourished study population, 90% were anaemic whereas 10% were only non-anaemic and in the total well-nourished study participants 29% were anaemic and 71% were non-anaemic. In the participants who has a BMI less than 18.5 kg/cm2 78% were anaemic and 22% were non-anaemic. In 58.9% of the study participants of BMI in the range of 18.5 to 25 kg/cm2 64% were anaemic and 36% were non-anaemic. The 13.9% of participants who had a BMI of more than 25 kg/cm2 38% were anaemic were as 62% were non-anaemic. In the total population who has taken iron supplements 61% were anaemic and 39% were non-anaemic and the study population who had not taken any iron supplements 80% had anaemia and 20% were not anaemic.

The health status of the study participants depends on the presence or absence of co-morbid conditions like pre-eclampsia, GDM, and thyroid disorders. According to the current study, 16.6% of the pregnant women were affected by pre-eclampsia followed by 10.6% affected by GDM and 26.5% affected by thyroid disorders. This is indicative of the poor health status of pregnant women (Figure 1).
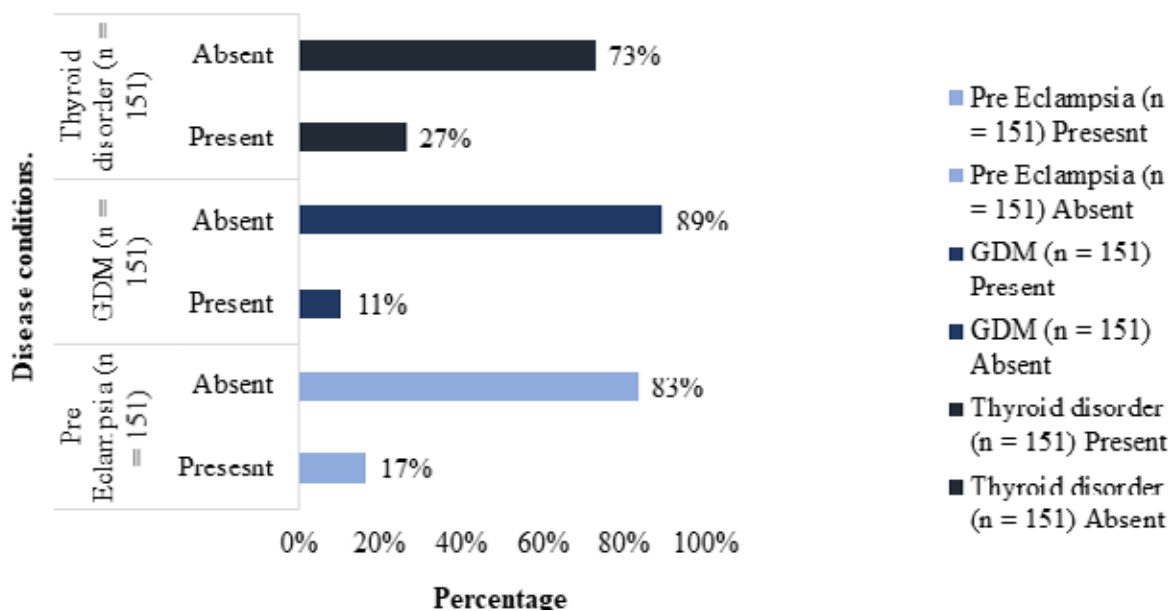

Fig 1: Health status of the study participants (n=151)*

Health status of the study participants depends on the presence or absence of co-morbid conditions like pre-eclampsia, GDM, and thyroid disorders. According to the current study, 16.6% of the pregnant women were affected by pre-eclampsia followed by 10.6% affected by GDM and 26.5% affected by thyroid disorders.

Conclusion

This study on the nutrition, health status, and prescribing pattern of drugs in pregnant women concluded that illiteracy and unemployment could have led to wide spread undernourishment and anaemia in pregnant women. It was found that participants who were underweight, undernourished, and have never taken iron supplements were more prone to anaemia. The study also concluded that the anaemic population were more prone to give birth pre-term and deliver under-weight new-borns. The health status of pregnant women is often affected by co-morbid conditions like pre-eclampsia, GDM and thyroid disorders; thyroid disorder was shown to have affected a greater number of study participants.

Improved practices and increased awareness of the nutritional requirements for pregnant women is the need of the hour. The healthcare workers must be made aware of the co-morbid conditions which could occur during pregnancy and treat them appropriately to have complication-free deliveries.

Acknowledgement

Conflict of interest

None

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