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# ASSESSMENT OF NUTRITIONAL STATUS AMONG PREGNANT WOMEN IN A SECONDARY CARE TEACHING HOSPITAL

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## ABSTRACT

**Background**: Malnutrition as a condition characterised by excess, imbalance or deficiency in person's energy and nutritive intake. WHO states that most of the countries in the world is afflicted with one or more types of malnutrition, which are under nutrition, overweight or obesity and micronutrient deficiency malnutrition. As per WHO report released in 2018, infants, children, adolescents and women have a particularly high risk rate of malnutrition and is the major cause for ill health and death than any other factor. To assess the nutritional status of pregnant women in a secondary care hospital and to analyze the cause of malnutrition using socioeconomic and demographic status. A prospective observational study was initiated for a period of 6 months from September 2019 to February 2020 in pregnant women of Department of OBG, K.C.G Hospital. Based on inclusion and exclusion criteria, 185 subjects were enrolled for the study. Sources of data were medical records and patient interview. Nutritional status was measured using self-assessing questionnaire, BMI, MUAC, and by calculating daily dietary intake. The mean value of the initial BMI of the total population was 26.3 kg/m$^2$. The mean value of the final BMI of the total population was 27.7 kg/m$^2$. **Conclusion:** The study found that even though the overall nutritional status of pregnant women were not alarming, certain aspects of nutrition was not met.

**KEYWORDS**: Pregnancy, Nutrition, Malnutrition, BMI, MUAC, Pregnant Women.

## INTRODUCTION

World Health Organization (WHO) defines malnutrition as a condition characterized by excess, imbalance or deficiency in person's energy and nutritive intake. WHO states that most of the countries in the world is afflicted with one or more types of malnutrition. As per WHO report (2018), infants, children, adolescents and women have a particularly high risk rate of malnutrition and is the major cause for ill health and death than any other factor.[1]

Malnutrition can be of three major types. Under nutrition which is characterized by underweight, stunting (low height for age), wasting (low weight for height) and deficiencies in vitamins and minerals. Overweight and obesity is a condition where there is abnormal accumulation of fat in the body. Obesity is characterized by a Body Mass Index (BMI) greater than 30 $kg/m^2$ which occurs due to an imbalance between energy consumed and energy expended.[2]

BMI is a factor commonly used for representing an individual's stoutness. A low maternal BMI or maternal under nutrition increases the risk of metabolic disorders in adult life of the child. BMI reduce risk associated during pregnancy, pre- pregnancy dietary counselling in community should be done for women who are under weight, over weight and obese. A study conducted in Karnataka, India states that maternal weight is directly proportional to the birth weight of a child.[3] A pregnant woman who has a BMI less than normal BMI (19.5) is recommended to gain 12.5-18 kg of weight during pregnancy. Women with normal BMI (19.8-26) should gain a weight of 11.5-16 kg during pregnancy. Women who are overweight (BMI- 26-29) should gain 7-11.5 kg and obese women (BMI- >29) should gain weight less than 7 kg.[4]

Another factor that can be used to assess malnutrition in pregnancy is Mid-upper arm circumference (MUAC). It is a measurement used for identifying protein- energy malnutrition & starvation. Since it is independent of gestational factors and is directly related to weight, it can be utilized as an indicator for recognizing poor pregnancy outcome.[5]

The 2017 global nutrition report stated that there was a rise in food deprivation from 777 million in 2015 to 815 million in 2017. Moreover, the study also highlighted that 2 billion people of the world lacked key micronutrients like iron and vitamin A, 155 million children were reported to be stunted, 52 million suffered from wasting, 2 billion and 41 million of adults and children were overweight, respectively.[6]

In GNR 18, even though a global improvement in nutritional status was observed, the rate was too slow and failed to spread across all forms of malnutrition. The report also stated that around the world, 150.8 million (22.2%) children presented with stunting of growth, 50.5 million (7.5%) suffered from wasting disorders while 38.3 million (5.6%) were found to be overweight. A comparative result obtained from GNR 2017 and GNR 2018 suggested that there was a slight improvement in overall nutritional status among children, globally. Despite the reduction in abnormal nutritional status, malnutrition persists as a major global issue for all the countries.[7]

National Food and Health Survey (NFHS-4 2015-16) in India reported there was a reduction in mortality rate, with 50 deaths per 1000 live cases among children below 5 years when compared to NFHS-3 (1992-1993) report.[8] As per Copenhagen consensus, 2012, one of the principle reasons that limit India's global economic potential is malnutrition.[9]

**MALNUTRITION IN PREGNANCY**

Health of pregnant women depend on their nutritional status. Pregnancy is an anabolic process characterized by series of adjustments in the mother's body to allow growth and development in fetus. Therefore, a malnourished woman would not be able to withstand the increased nutrient requirement that arises during pregnancy.[2]

Good nutritional status for women during pregnancy is essential for healthy outcome. Maternal malnutrition depends primarily on the diet and dietary pattern with essential nutrient contents positively influencing placental development. Poor maternal nutrition and infection during pregnancy can result in low birth weight (LBW), growth retardation in uterus and mortality and morbidity in mothers. The major cause of LBW in underdeveloped countries is intrauterine growth restriction (IUGR) and in developed countries it is caused by preterm birth. IUGR is mainly caused by poor nutritional status in mothers during gestational period, poor improvement in weight during pregnancy as a result of inadequate dietary consumption or increased usage of energy. The other factors that contribute to IUGR are low maternal height, poor nutrition, anemia and under-nutrition due to acute and chronic infections. Poor pregnancy outcomes including LBW, and prematurity can also be caused by high blood pressure in mothers, strenuous activities, numerous deliveries, tension, anxiety, and other psychological factors such as domestic violence.[10]

Anemia is a condition characterized by reduction in hemoglobin (Hb) concentration and there by results in inadequate oxygen carrying capacity of blood which is considered as one of the most relevant and frequent complication in pregnancy. The negative outcomes of anemia are spontaneous abortions, LBW, preterm delivery, stillbirth, and fetal complications.[11] Anemia is identified to be second most common cause of maternal morbidity in India, and it contributes to around 80% of it in Southeast Asia.[12] In a healthy woman, the plasma volume inclines at 6$^{th}$ week of gestation. The elevation is about 48% more than a non-pregnant woman that is 1,250 ml per term. Iron-deficiency anemia and folic acid deficiency anemia are the commonly encountered anemia during pregnancy. Around 75% of anemia during pregnancy is due to deficiency in iron. Anemia can also be caused by hemoglobinopathies, inflammatory diseases, chemical toxicity or malignancy. The major symptoms and signs of anemia in pregnancy include tiredness, numbness or tingling sensations, elevation in heart rate and breath rate, paleness, glossitis, and cheilitis. A severe reduction in hemoglobin level (6g/dl) can result in life threatening complications like congestive cardiac failure and reduction in perfusion of vital tissues and organs. Severe anemia may result in premature delivery, unpredictable abortions, LBW and fetal mortality.[11]

Adequate energy supply is required for promoting growth of the child. Inter individual energy requirements varies widely and it is estimated that pregnant women require an additional energy of 5%, 10% and 25% in trimesters 1, 2 and 3 respectively. For a healthy nurtured woman with a normal BMI, a total of 70 Kcal, 260 Kcal, 500 Kcal of energy is required per day in first, second and third trimester respectively. Foods rich in energy like milk and dairy products, lean red meat, fish, fruits and vegetables should be included in diet.[2]

Protein helps in the formation of structural unit of body in both mother and fetus and essential for development of a healthy baby. Vegetable sources like peas, lentil, beans and eggs and dairy product are rich in protein.[2]

Adequate fat should be included in diet as it is an important source of energy and aids for absorbing vitamins which are only fat soluble. Docosahexaenoic acid (DHA) which is a long chain omega-3 polyunsaturated fatty acid is important for development of fetus. Oil rich fish like trout, salmon, mackerel, and sardines are sources of DHA.[2]

Folic acid- It is a synthetic form of naturally occurring vitamin B. Daily supplement of 400 mcg folic acid is recommended as a daily recommended for first 12 weeks of pregnancy. It is

also necessary to prevent neural tube defects in newborns. Legumes, eggs, leafy greens, beets, citrus fruits, sprouts, broccoli contain high level of folic acid.

Dietary iron intake is essential to provide adequate oxygen. Development and growth of the fetus requires iron for forming a large RBC mass. Vitamin C is obtained from fruits and vegetables. Certain food substances like tea contains tannin prevents the absorption of vitamin C, hence it should be avoided with meals.[2]

Vitamin D, a fat-soluble vitamin which helps to prevent autoimmune disease is essential for absorption of calcium. Foods like margarine, milk, cereals, fat rich fish and code liver oils are rich source of vitamin D. Pregnant women can also be advised with supplementation of 5 micrograms of vitamin D if needed.[2]

Prevention and control of malnutrition in pregnancy is essential, as maternal malnutrition is the major cause for maternal and child mortality. The government of India has initiated various national wide programmes to gradually reduce malnutrition by improving maternal nutrition and to curb maternal mortality and child malnutrition.[13]

## MATERIALS AND METHODS

Based on inclusion and exclusion criteria study subjects were selected and were provided with informed consent forms. We interviewed each subject and data received was recorded using patient data collection form. The data collected include.

- Demographic details including age, occupation and educational details.
- Obstetrics data include gravity and parity data, age at first pregnancy, inter pregnancy interval.
- Anthropometric details include BMI and MUAC.
- Biological data (severity of anemia based on hemoglobin count).

Each subject was then provided with self-assessing questionnaire to collect information on their daily nutritional intake. Based on the nutritional data collected, the daily nutritional intake of each nutrient (energy, carbohydrate, protein, fat, calcium and iron) was calculated using NIN (National Institute of Nutrition) mobile application. The calculated values were then compared with recommended daily allowance (RDA) for each nutrient.

The data was collected by interviewing the study subjects, referring OPD case files and laboratory investigation reports and by providing self- assessment questionnaires. The data was collected through a predesigned data collection form.

## RESULT

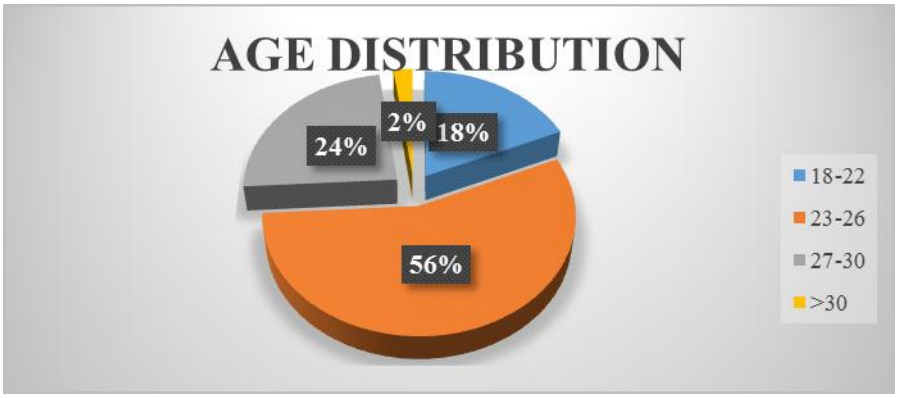
Based on inclusion and exclusion criteria, our study assessed 185 pregnant women who visited hospital as part for their antenatal visits in the Department of Obstetrics and Gynecology, K. C. General Hospital, Bangalore for a study period of 6 months from September 2019 to February 2020.

### 1. DEMOGRAPHIC DETAILS

### 1.1 AGE DISTRIBUTION

**Table 1: represents age distribution categorized into different age groups.**

| Sl No. | Age group (in years) | Number of study subjects | Percentage (%) |
|---|---|---|---|
| 1. | 18-22 | 34 | 18 |
| 2. | 23-26 | 103 | 56 |
| 3. | 27-30 | 44 | 24 |
| 4. | >30 | 4 | 2 |




### 1.2 EDUCATIONAL STATUS

On interviewing the study subjects, our study found that, out of 185 subjects, 17 (9%) of the population were illiterate, 67 (35%) of the population were SSLC passed, 73(39%) of the population completed their higher secondary education and 32(17%) of the population were graduates.

### 1.3 OCCUPATION

On assessing we found that, out of 185 study subjects, 177 (95.67%) were home makers and 7 (3.78%) were professional workers.

## 2. OBSTETRICS DATA

### 2.1 AGE AT FIRST PREGNANCY

Based on age at first pregnancy, study subjects were categorized into four main groups. Our study observed that 92(49%) pregnant women belonged to the age group of 18-22 years, 75 (41%), 16(9%) and 2(1%) of the study population belonged to the age group of 23-26 years, 27-30 years and >30 years respectively at the time of their first pregnancy.

### 2.2 INTER PREGNANCY INTERVAL

On analyzing the inter pregnancy interval in our study subjects, our study found that 8(4%), 34(18%), 24(13%) and 40(22%) had their second pregnancy in less than one year, after I to 2 years, after 2-3 years and after more than 3 years respectively.

### 2.3 GRAVIDA

On assessing the obstetrics data of 185 pregnant women, we found that 78 (42.16%) women were pregnant for the first time, 81(43.78%), 18 (9.72%) and 9 (4.86%) of the population were pregnant for the second, third and more than three times respectively.

### 2.4 PARITY

On assessing the parity status of 185 study subjects, we found that 69(37.39%) of them failed to carry the pregnancies to viable gestational age (24 weeks or more). Whereas, 73(39.45%), 4(2.16%) and 2(1.08%) of the population had parity status of one, two, three and more than 3.

## 3. ANTHROPOMETRIC VALUES

**Table 2: represents the BMI of the study subjects.**

| Sl No. | Body Mass Index (kg/m$^2$) | Number of study subjects | Percentage (%) |
|---|---|---|---|
| 1. | Underweight (<19.8) | 15 | 8.1 |
| 2. | Normal weight (19.8-26) | 47 | 25.4 |
| 3. | Overweight (26-29) | 49 | 26.5 |
| 4. | Obesity (29) | 74 | 40 |

## 3. ANTHROPOMETRIC VALUES

### 3.1 BODY MASS INDEX (BMI)

Based on BMI, pre-pregnancy weight can be categorized into four major groups.

- Underweight
- Normal weight
- Over weight
- Obese

We assessed the weight, height and calculated the BMI of the pregnant women as part of the antenatal care. Our study observed that, out of 185 study subjects 15 (8.1%) were underweight, 47(25.4%), 49(26.5%) and 74(40%) were normal weight, overweight and obese, respectively.

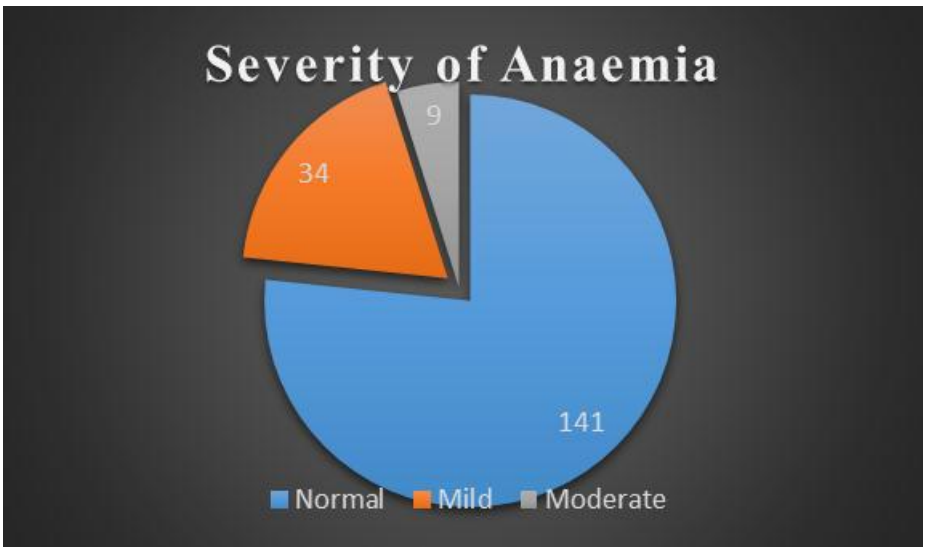
### 3.2 Mid Upper Arm Circumference (MUAC)

Mid Upper Arm Circumference or MUAC is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow. MUAC is used for the assessment of nutritional status. The normal value of MUAC is 22 cm. In this current study, we measured the MUAC of all the pregnant women. We found that out of 185 pregnant women, 175 of them had MUAC more than 22 cm and 10 had MUAC less than 22 cm.

## 4. BIOLOGICAL DATA

### 4.1 SEVERITY OF ANAEMIA

Based on of hemoglobin count, anemia is categorized into five major groups. Our study observed that out of 185 study subjects, 141 patients had normal hemoglobin count (>11 g/dl). 34 patients were found to be mildly anemic (10-10.9 g/dl) and 9 patients were found to be moderately anemic (7.1-9.9 g/dl).



## 5. DIETARY INTAKE

**Table 3: represents the nutritional status of the study subjects.**

| Sl No. | Nutrients | Number of pregnant women with nutrient intake less than RDA | Mean | Minimum | Maximum |
|---|---|---|---|---|---|
| 1. | Carbohydrate | 86 | 208.42 g | 24.4 g | 827.7 g |
| 2. | Protein | 94 | 61.0155 g | 7.11 g | 624.53 g |
| 3. | Calcium | 148 | 283.177 g | 0.006 g | 1812.28 g |
| 4. | Iron | 162 | 10.1492 g | 0.0001 g | 327 g |
| 5. | Fat | 67 | 60.0116 g | 0.91 g | 717.27 g |
| 6. | Energy | 147 | 2051.8201 kcal | 11.3 kcal | 134044 kcal |

## DISCUSSION

Maternity phase is the most important and crucial period as it contributes to development of next generation and continuation of human life. Malnutrition during pregnancy may cause various complication and can even be life threatening for both mother and the baby. Therefore, nutritional status during pregnancy should be assessed properly and appropriate measures should be taken to minimize the unpleasant pregnancy outcome.

Data from a total of 185 patients who met all the inclusion criteria were taken for the study. The data collected were analyzed for the assessment of nutritional status during pregnancy.

In our study, subjects mostly belonged to the age group of 23-26 years (56%) and 27-30 years (24%). Our observation was nearly similar to the findings of a study conducted by A.M.N.T. Adikari et.al where the most common age group was 20-29 years (74.44%).

In a study conducted by M. R Mudhaliar et.al, most of the pregnant women's in the study were illiterate (35.45%) followed by matriculate(21.82%) whereas in our study most of the study subjects had higher secondary (39%) education followed by intermediate SSLC(35%). Occupational status of women were classified as housewife and professional. Our study identified that 95% of women were housewife and only 5% were employed. These finding were proportionate to results of the study conducted by A.M.N.T. Adikari et.al in which 83.46% of the women were unemployed and only 16.54% were employed.

A study conducted by M. R Mudhaliar et.al revealed that parity status in most of the study subjects was 1 (50%) and the least being >3 (2.27%). These results were found to be in consistent with our study where most of the women had a parity of 1 (39.45%) and the least being >3 (1.08).

Our study also evaluated anthropometry of pregnant women using BMI and MUAC.

BMI of pregnant women in our study was classified into 4 group, where most women belong to obese group (40%), followed by overweight (26.5%) and normal weight (25.4%). These findings were found to be in contrast with the study conducted by A.M.N.T. Adikari et.al where most of the pregnant women belonged to the group of normal weight (44.36%), followed by overweight (35.34%) and underweight (15.04%).

In all the pregnant women who participated in our study, the mean initial BMI was found to be 26.06 $kg/m^2$ and final BMI was found to be 29.14 $kg/m^2$. These results were proportionate to the findings of S. Taleb et. Al in which the initial BMI of pregnant women were found to be 26.3 $kg/m^2$ and final BMI was found to be 27.7 $kg/m^2$.[40]

Our study identified that most pregnant women had an MUAC >22 cm (94.6%) and only few study subjects had an MUAC less than 22cm (5.4%). The results were nearly similar to the study conducted by Mariyam and Dibaba were 68.18% women had an MUAC <22 cm and only 31.8% had an MUAC >22 cm.

In our study mean value of energy, protein, iron, calcium intake was calculated to be 2472.02, 74.19, 16.52, 844.95 respectively. Moreover, in a study conducted by A.M.N.T Adikari et.al the mean value of energy, protein, iron, calcium intake were 2051.82, 61.055, 10.1492, 283.177 respectively, thereby showing a close resemblance to our calculated values. The number of study subjects who have their nutritional intake value for energy, protein, iron calcium below their respective RDA value were found to be 142 (76.75%), 94 (50.81%), 162 (87.56%), 148 (80%) respectively. Furthermore, the study conducted by A.M.N.T Adikari et.al also revealed that 44(33.08%), 16 (12.03%), 133 (100%), 101 (75.93%) pregnant women in the study respectively had a nutritional intake value for energy, protein, iron calcium below their respective RDA

## CONCLUSION

Our study enrolled 185 pregnant women. The study observed that most of the study subject were obese and had a higher BMI value than the recommended BMI. The result showed that most of the woman had a MUAC value higher than 22 cm. Severe anemia was not observed in most of the patients even though some subjects showed mild to moderate anemic conditions but their daily dietary intake was not sufficient and does not meet the

recommended RDA value. The intake of protein, carbohydrate, energy, fats, calcium and other essential micro and macro nutrients were less than RDA value in majority of the study population. The study found that even though the overall nutritional status of pregnant women was not alarming, certain aspects of nutrition was not met due to a lack of information regarding importance of nutrition and healthy nutritional practices.

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