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HEALTH AND MEDICAL STATUS OF PREGNANT WOMEN FROM 2 SOCIO-ECONOMIC STRATA FROM MUMBAI CITY

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ABSTRACT

The nutritional status of women when becoming pregnant and during pregnancy can have significant influence on foetus. Micronutrient deficiencies could lead to poor maternal health outcomes and pregnancy complications. Poor maternal weight gain in pregnancy due to an inadequate diet increases the risk of complications. A pre-tested questionnaire was used to collect information regarding medical history and supplementation from 100 pregnant women. Overall (27%) women were underweight, (54%) normal weight, (16%) overweight and (3%) obese. (38%) pregnant women had constipation, (43%) heartburn, (25%) nausea, (38%) vomiting, (5%) asthma, (1%) depression, (5%) urinary tract infection, (8%) edema and (3%) preeclampsia. Significantly higher percentage of pregnant women visiting government hospital suffered from vomiting ($\chi2 = 4.244$, $p<0.05$) Overall 18% women had moderate anemia and 39% had mild anemia. There was a significant association of type of hospital and the supplements consumed like calcium, iron, folic acid, vitamin B12, protein and multivitamin by the pregnant women with higher percentage of women from private hospitals consuming all the 6 nutritional supplements and specifically multivitamin as compared to government hospitals ($\chi2=13.691$, $p=0.018$), ($\chi2=31.57$, $p<0.05$). Health awareness programs need to be planned to improve the medical and health status of pregnant women from government hospitals.

INTRODUCTION

Nutritional awareness is very important during pregnancy. Pregnancy is physiologically and nutritionally a highly demanding period. Extra food and supplements are required to meet the requirements of the foetus. A woman prepares herself to meet the nutritional demands by increasing her own body fat deposits during pregnancy. A lactating mother requires extra food to secrete adequate quantity/ quality of milk and to safe guard her own health (NIN/ICMR, 2011). India is world's capital for low birth weight (LBW), which is ascribed to intrauterine growth restriction (IUGR) rather than prematurity. An average Indian mother is short and thin and gives birth to a light and thin baby. Maternal under nutrition is thought to be a major factor in the etiology of IUGR, and the under nutrition is usually thought to be a low macronutrient intake (Yajnik *et al*, 2012). Concerns about the increasing rates of obesity in developing countries have led many policy makers to question the impacts of maternal and early child nutrition on risk of later obesity. Poor prenatal dietary intakes of energy, protein and micronutrients were shown to be associated with increased risk of adult obesity in offspring. Female offspring seem to be more vulnerable than male offspring when their mothers receive insufficient energy during pregnancy (Yang Z *et al*, 2012). Low-income women experiencing life stressors represent an at-risk group for low diet quality and may need intensive dietary intervention before and during pregnancy (Fowles *et al*., 2012). Folic acid supplements can protect against neural tube defects (NTDs). Low folate and low vitamin B_{12} status may be maternal risk factors for having an NTD affected pregnancy. However, not all NTDs are preventable by having an adequate folate/ B_{12} status and other potentially modifiable factors may be involved. Folate and vitamin B_{12} status have important links to iron metabolism. Adding iron to folic acid for periconceptional use may improve iron status but is not likely to prevent NTDs (Branum Amy *et al*., 2013).

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MATERIALS AND METHODS

Data of the subjects were collected with the help of a pretested oral cum interview questionnaire was devised and

administered to collect the information. Participation was voluntary and informed consent was obtained from all participants. The sample size was 100. The samples were divided into two equal groups' i.e. 50 samples from private and other 50 from government in order to gain a comparative study of the two. This gave an idea on how the eating habits, lifestyle and nutrient intake, physical activity etc of two differed at a same physiological state. The ages of the samples were from 20-45 years. As it is the ideal reproductive age in India. The target groups for the study were the patients from few of the city hospitals / nursing home. The Ethical Committee approval for this study was taken from the Ethical Committee-Seva Mandal Education Society (S.M.E.S Institution) of Dr. B.M.N. College Of Home Science. The CTRI number for the study: CTRI/2015/04/005730. The data on anthropometric measurements, Medical history, biochemical parameters and consumption of supplements were collected through a pretested oral cum interview questionnaire.

Statistical Methods

Analyses were performed using SPSS software for Windows (version 16.0, 2007, SPSS Inc, Chicago, IL). Data are presented as Mean ± SD or frequency (percentage). Independent sample T test was sued to analyses the difference between pregnant women from private and government hospitals. The frequency distributions were tabulated for various parameters according to hospital type and were compared using cross tabulations and chi-square test P-value < 0.05 was considered to be statistically significant.

RESULTS AND DISSUCSSION

Data was analyzed on 100 pregnant women (50 private hospitals) with mean age of 26.6 ± 4.1 years.

Anthropometry

The mean pre pregnancy weight of the subjects was 50.9 ± 11.1 kg, current weight was 55.4 ± 11.6 kg, height was 154.27± 4.64 cm. The mean pregnancy BMI was 21.3±4.0 kg/m^2. Table 1 presents the anthropometric characteristics of study population when classified according to hospital type. As seen in Table 1, pregnant women from private hospitals had significantly higher age, weight and height as compared pregnant women from government hospitals ($p<0.05$). The mean BMI for government hospital was less as compared to private hospitals; however, this difference was not significant.

Table 1. Anthropometric characteristics of pregnant women according to hospital type

	Private hospital (n=50)	Government hospital (n=50)	P value
Age (years)	27.9±4.7	25.4±3.1	0.002
Pre pregnancy weight (kg)	54.1±13.6	47.8±6.1	0.004
Current weight (kg)	58.9±14.6	51.9±6.7	0.002
Height (cm)	156.3±5.1	152.3±3.1	0.001
Pregnancy BMI (kg/m^2)	22.1±4.8	20.6±2.9	0.065

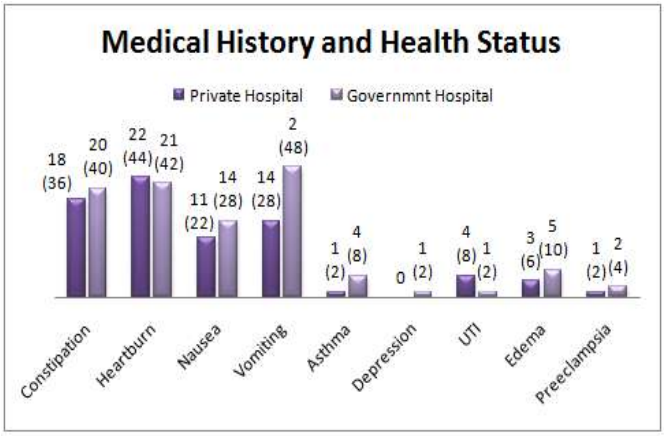
Data presented as Mean±SD.

Using the pre-pregnancy weight and IOM 2009 cut-offs were classified as underweight, normal, overweight or obese. From the 100 women, 27% women were underweight (BMI ≤18.5 kg/m^2), 54% women had normal weight (BMI 18.5 – 24.9 kg/m^2), 16% women were overweight (BMI 25 – 29.9 kg/m^2) and 3% women were obese (BMI ≥30 kg/m^2). The percentage of overweight [11 (22%)] and obese [3 (6%) women was higher in private hospitals as compared to government hospitals [overweight 5 (10%); obese 0(0%)]. On the other hand percentage of underweight [13 (26%)] and normal [23 (46%)] was lesser in private hospitals as compared to government hospitals [underweight 14 (28%); normal 31 (62%)]. However, there was no significant association in the weight status of the women and the type of hospitals ($\chi2=6.742$, $p=0.091$).

Similar studies were seen to report that ideally weight gain during pregnancy is needed due to increased energy and nutrient needs of the subjects. A cross-sectional study explained that additional energy required during pregnancy consists of firstly, increase in TEE during pregnancy, most of which occurs during 2nd and 3rd trimesters. Also, the increase in pre-pregnancy body weight and pre-pregnancy BMR is common and much needed. Tissue deposition increases during pregnancy as protein and fat in the foetus and the mother and depends upon the total weight gain during the 9 months of pregnancy which may range from 10 to 14 kg with an average of 12 kg. Although, in the Indian reference women with pre-pregnancy weight of 55 kg, the body weight gain may be an average of 10 kg (Gopalan *et al*., 2010). But, the studies by Artal *et al*, (2010) the researcher explains that excessive gestational weight gain and obesity have been recognized as independent risk factors for maternal and foetal complications of pregnancy with significant lifelong consequences. Weight gain for all obesity classes is also of concern, because higher body mass index levels were associated with more severe pregnancy complications, such as preeclampsia and gestational diabetes.

Medical history and health status of pregnant women

Medical history and health status of all 100 pregnant women was assessed. None of the women were suffering from HIV or Hepatitis. Off the 100 women, 38% had constipation, 43% had heartburn, 25% had nausea, 38% had vomiting, 5% had asthma, 1% had depression, 5% had urinary tract infection, 8% had edema and 3% had preeclampsia. Figure 1 illustrates the medical history and health status of pregnant women when classified according to hospital type. Significantly higher percentage of pregnant women visiting government hospital suffered from vomiting as compared to those visiting private hospital ($\chi2 = 4.244$, $p<0.05$) (Figure 1). There was no significant difference in the prevalence constipation ($\chi2=0.170$), heartburn ($\chi2=0.041$), nausea ($\chi2=0.480$), asthma ($\chi2=1.895$), urinary tract infection ($\chi2=1.895$), edema ($\chi2=0.543$) and preeclampsia ($\chi2=0.344$) among women from private or government hospital ($p>0.05$) (Figure 1). A study by Laopaiboon, (2014), reported that constipation in adult women during pregnancy a survey was done to check the prevalence of constipation in pregnancy. It was found to range from 11% to 44% within the population which was considered to be significant. The researcher also explained that along with constipation heartburn was also seen to be common. Nausea and vomiting of pregnancy were the most common medical condition during gestation, carrying tremendous health burden



Data presented as frequency (percentage)

Figure 1. Medical history and health status of pregnant women according to hospital type

on the women suffering from it. Almost 70% of women suffered from some form of the syndrome with common symptoms (Einarson, Piwko and Koren *et al*, 2012). Asthma was also one of the major discomforts which occurred in women only during pregnancy. It was one of the most common chronic diseases in women of reproductive age, occurring in up to 8 % of pregnancies (Hansen *et al*, 2013). During pregnancy, urinary tract infection (UTI) was associated with increased risks of maternal and neonatal morbidity and mortality, even when the infection is asymptomatic (O'Brien, 2013). Hypertensive disorders of pregnancy include chronic hypertension, gestational hypertension, pre-eclampsia and chronic hypertension with superimposed pre-eclampsia. Pre-eclampsia complicated about 3% of pregnancies, and all hypertensive disorders affect about 5 to 10% of pregnancies. Secular increases in chronic hypertension, gestational hypertension and pre-eclampsia have occurred as a result of changes in maternal characteristics (such as maternal age and pre-pregnancy weight) (Hutcheon *et al*, 2011). Elevated blood pressure during pregnancy, regardless of type and even without known risk factors, signals high risk of later cardiovascular disease, chronic kidney disease, and diabetes mellitus. Clinical monitoring, risk factor evaluation, and early intervention could benefit women with hypertension in pregnancy (Mendola *et al*, 2013).

Biochemical Parameters

Biochemical parameters of the women were noted from their medical records. The mean random glucose was 82.319±7.77, mean hemoglobin was 10.934±1.11 and the mean systolic and mean diastolic BP was 108.2±11.49 and 69.16±7.40 respectively. Biochemical parameters of the women according to hospital type are given in Table 3. As seen in Table 3, systolic BP was significantly higher in women visiting private hospitals as compared to government hospitals ($p<0.05$). There was no significant difference in any other bio-chemical parameters ($p>0.05$) (Table 3). Using the World Health Organization classification 2009, women were diagnosed for anemia (Reference: http://www.who.int/vmnis/indicators/haemoglobin.pdf). Off the 100 women, 18% women had moderate anemia (hemoglobin 7 – 9.9 g/dl), 39% had mild anemia (hemoglobin 9.9 – 10.9 g/dl) and 43% had normal hemoglobin levels (hemoglobin ≥11 g/dl).

Table 3. Biochemical parameters according to hospital type

	Private hospital (n=50)	Government hospital (n=50)	P value
Random blood glucose (mg/dl)	81.6±6.98	83±8.51	0.384
Hemoglobin (g/dL)	10.9±0.938	10.9±1.2	0.592
Systolic BP (mmHg)	111±12	106±7	0.036
Diastolic BP (mmHg)	80±7	68±8	0.196

Data presented as Mean±SD

There was no significant association of prevalence of anemia and type of hospital [Private hospital: moderate anemia 8 (16%); mild anemia 18 (36%) and normal 24 (48%)] [Government hospital: anemia 10 (20%); mild anemia 21 (42%) and normal 19 (38%)] ($\chi2=1.034$, $p=0.596$). The random blood glucose levels in the present study conducted was seen to be a within the normal range of blood glucose levels. In similar studies by other researchers, the risk of gestational diabetes amongst pregnant women was seen to be on the rise. Populations are especially vulnerable to developing this condition because of genetic, social, and environmental factors. In a study by Pridjian and Benjamin, (2010), the researchers explained that good blood sugar control is important before becoming pregnant, because many women do not even know they are pregnant until the baby has been growing for two to four weeks as high blood sugar levels early in the pregnancy (before 13 weeks) can cause birth defects. They also can increase the risks of miscarriage and diabetes-related complications. This can be made possible balancing meals, exercise, and resorting to diabetes medications if need be. The subjects in the present study were also screened for haemoglobin. The ideal haemoglobin levels during pregnancy being 11.6 – 13.9 g/dL in the first trimester, 9.7-14.8 g/dL in the second trimester and 9.5- 15 g/dL in the third trimester was ascertained as against 12-15 g/dl for non-pregnant women (Allen *et al*, 2009). Thus, there were substantial increases in haemoglobin requirements of pregnant women and the subjects in the present study were falling into the lower side of this range. This could signal iron deficiency in the subjects the consequences of which are discussed in the later part of the chapter.

Consumption of Supplements

None of the 100 women were taking any kind of medicine. Off the 100 women, 91 women were consuming nutritional supplements while 9 were not consuming any supplements.

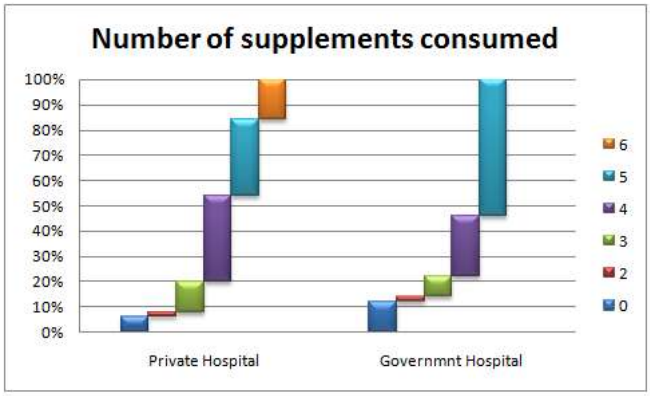


Figure 2. Number of supplements consumed by pregnant women according to hospital type

Figure 2 illustrates the percentage of women consuming different number of supplements. There was a significant association of type of hospital and the number of supplements consumed by the pregnant women with higher percentage of women from private hospitals consuming all the 6 nutritional supplements as compared to government hospitals ($\chi 2$=13.691, p=0.018) (Figure 2).

Data presented as percentage

The percentage consumption of different supplements was assessed. Seventy one percentage pregnant women were taking calcium supplements, 89% were taking iron supplements, 24% were taking multi-vitamin supplement, 81% were taking folic acid supplement, 56% were taking protein supplement and 87% were taking vitamin B 12 supplement. Table 2 presents percentage of women from private and government hospitals taking various supplements. Significantly higher percentage of pregnant women visiting private hospital hospitals were consuming multivitamin supplements as compared as pregnant women visiting government hospitals ($p<0.05$) (Table 2). There was no significant difference in percentage of pregnant women consuming other supplements when classified according to hospital type ($p>0.05$) (Table 3).

Table 3. Percentage of pregnant women taking supplements according hospital type

	Private hospital (n=50)	Government hospital (n=50)	$\chi 2$	P value
Calcium	33 (66)	38 (76)	1.210	0.271
Iron	46 (92)	43 (86)	0.919	0.338
Multivitamin	24(48)	0 (0)	31.57	0.001
Folic acid	38 (76)	43(86)	1.627	0.202
Protein	26 (52)	30 (60)	0.649	0.420
B12	44 (88)	43 (86)	0.880	0.766

Data presented as frequency (percentage)

Calcium supplementation was recommended for subjects during pregnancy as it was seen to decrease chances of subjects being prone to hypertension and allied cardiovascular diseases (Hofmeyr *et al*, 2014). The subjects with a low-calcium diet, a calcium supplement of 1500 mg/d during pregnancy resulted in higher maternal bone mineral content in the subsequent lactation that persisted long term (Jarjou *et al*, 2013). Similar results were obtained when the study by Imdad *et al*., (2012) concluded that calcium supplementation during pregnancy was associated with a reduction in risk of gestational hypertensive disorders and pre-term birth and an increase in birth weight. There was no increased risk of kidney stones. A study concluded that the major insufficiency and deficiency during pregnancy that is observed is of iron. Iron deficiency involves an insufficient supply of iron to the cells following depletion of the body's reserves. Its main causes are a diet poor in absorbable iron, an increased requirement for iron (e.g. during pregnancy).Chronic iron deficiency frequently turns into iron deficiency anaemia in women which results in symptoms such as fatigue and tiredness (Rosas *et al*, 2012). Vitamins are vital micronutrients during pregnancy and supplementation of the same was found to be necessary as the supply through diets was considered to be insufficient for the increased nutrient needs of the subjects. Vitamin D and E was seen to be most common for improved bone health and improvement in skin and hair health of the subjects and the foetus. (Hollis, 2011). In his cross sectional study, Vadillo *et al*, (2011) explained that supplementation during pregnancy with L-arginine and antioxidant vitamins in medical food had a positive effect on pre-eclampsia in high risk population. Also, positive effects of vitamin A or beta carotene supplementation on pregnancy-related mortality and infant mortality on pregnant women in rural populations were observed. An insufficient supply of vitamin B12 caused reduced foetal growth in vegetarian women, and hence supplementation of vitamin B12 may be needed for pregnant women who consumed only vegetarian diet (Hovdenak, 2012). Similar results were obtained in a study by Ahmad *et al*, (2015) were the researcher explained that vitamin B12 supplementation during pregnancy and postpartum improves B12 status of both mothers and infants. Providing pregnant females with balanced protein energy supplementation leads to reduction in risk of small for gestational age infants, especially among undernourished pregnant women. Given these findings, the study recommended balanced protein energy supplementation as an intervention among undernourished women to be beneficial (Imdad, 2011). Also, balanced protein-energy supplementation was an effective intervention to reduce the prevalence of LBW and small-for-gestational-age births, especially in undernourished women (Bhutta, 2012).

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