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NUTRITIONAL AWARENESS OF THE PREGNANT WOMEN IN MUMBAI CITY

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ABSTRACT

Introduction: The nutritional status of women when becoming pregnant and during pregnancy can have significant influence on foetal and maternal health outcomes. Micronutrient deficiencies can lead to pregnancy complications. Poor maternal weight gain in pregnancy due to an inadequate diet increases the risk of premature delivery, low birth weight and birth defects.

Objectives: To study the dietary habits, nutrient intake and about nutritional knowledge of pregnant women from 2 socio-economic strata from Mumbai City

Methods: A cohort study was conducted on pregnant women with 50 women each visiting private and government hospital. A pretested oral cum interview questionnaire was devised and administered to collect the relevant information

Results: A significant association of number of meals ($\chi^2=14.729$) snacks ($\chi^2=18.415$) and appetite ($\chi^2=12.906$), was found with women from private hospitals consuming more meals and snacks per day ($p<0.05$) and had increased appetite in comparison to pregnant women from government hospital ($p=0.002$). For difficulty in food consumption, 22% pregnant women reported difficulty eating cereals, 21% soya, 5% animal products, 18% fruits, 8% vegetables and 22% milk and milk products. Significantly higher percentage of women from private hospitals had better nutritional knowledge during pregnancy carried snacks to work/out, knew that nutrient needs increases from 2nd trimester, were aware of how many servings of foods they should eat/day as compared to women from government hospitals ($p<0.05$)

Conclusion: Pregnant women from private hospital had better dietary habits, nutrient intake and nutritional knowledge. Nutrition knowledge and awareness programmes need to be planned for pregnant women from government hospitals..

INTRODUCTION

Consumption of healthy foods is more important during pregnancy. The need for calories, protein, iron, calcium, and folic acid increases during pregnancy. But "eating for two" doesn't mean eating twice as much. Rather, it means that the foods they eat are the main source of nutrients for the newborn. A nutritious & balanced meal combined with regular physical fitness is still the best recipe for good health during the pregnancy.

Pregnancy is physiologically and nutritionally a highly demanding period. Extra food is 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)

In India, it is observed that diets of women from the low socioeconomic groups are essentially similar during prepregnant, pregnant and lactating periods. Consequently, there is widespread maternal malnutrition leading to high prevalence of low birth weight infants and very high maternal mortality. Additional foods are required to improve pregnancy weight gain and birth weight of infants, Pre-pregnant BMI, maternal age and rate of pregnancy weight gain must be considered in tailoring the calorie recommendation to the pregnant women.

Ferraria R M et al, (2013) said that women commonly reported overwhelming and confusing diet advice and a paucity of physical activity advice that was largely limited to walking. Women would benefit from more clear guidance from physicians and other providers regarding dietary choices and physical activity in pregnancy. Providers must make dietary and physical activity advice in pregnancy more clear and individualized and offer such guidance multiple times throughout pregnancy.

Garg A et al, (2006) stated that individual counselling with weekly reinforcement can bring about improvement in nutritional status during pregnancy. Imdad et al, (2012) in other study said A balanced protein-energy



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supplementation is an effective intervention to reduce the prevalence of LBW and small-for-gestational-age births, especially in undernourished women.

Nutrition Screening Form information can help increase awareness among health professionals and patients about the important link between nutrition, fertility, and successful reproductive outcomes. (Langley S et al, 2014)

METHODOLOGY

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

PHYSICAL ACTIVITY: Despite popular belief, exercise while pregnant does not initiate labour, or preterm labour. Exercise is associated with delivering closer to the due date. Further, maternal exercise is associated with either no change, or shorter labour and delivery overall. Women who exercised had fewer complications during labour and delivery than those who did not exercise. More importantly, measures of the foetus during the labour and delivery process did not indicate foetal distress. Measures of foetal distress showed either no difference or improvements related to exercise exposure, such as increased apgar scores. Exercised mothers and their children had shorter hospital stays relative to no exercisers. Overall, these findings of possibly shorter labour, less preterm labour, less complications, and decreased hospital stay all add up to decreased health-care costs.

Patient's physical activity was noted in terms of very active, moderately active, somewhat active and not active. They were also asked which activities they performed and for how long. Activities like yoga, breathing exercises, meditation, walking, aerobics, swimming etc. the duration of activities ranged from 15mins to more than one hour.

Samples from the government hospital were more active when it came to household work in comparison to samples from private hospital.

EATING HABITS AND LIFESTYLE: Eating habits have a great impact on pregnancy. Many women are unable to eat during their first trimester due hyperemesis gravidarum etc. eating habits like how many meals and snacks do they consume in a day, has their diet increased or decreased significantly during pregnancy or it has not changed at all. If they are finding any difficulties in consuming a particular food group like cereals, pulses, non vegetarian foods, milk and milk products, vegetables, fruits etc. They were also asked if they consumed any nutritional supplements. As many women are unable to eat their normal diet, so through supplements they could get their basic requirements of protein and essential vitamins and minerals. Other than this lifestyle also plays a major role in the development of the foetus. If the mother consumes alcohol, smokes cigarettes, or consumes drugs like marijuana, cocaine etc it may have adverse effect on the foetus and also may lead to certain abnormalities in the new born.

THREE DAY 24 HOUR DIETARY RECALL: The 24-hour dietary recall interview (24HR), is commonly used both as an intensive method of assessment for intervention studies. As diets vary considerably from day to day, the ability of a single 24HR to provide an accurate estimate of long-term energy intake is limited. So, researchers have suggested that 3, 4, 5, or 7 days are necessary to adequately estimate energy intake (Yunsheng MA *et al*, 2009). An average of all the three days were calculated and estimated and further used for their average daily nutrient intake. This was done basically to see if they are eating sufficient calories according to their increased requirements from 2nd trimester.

Pros

- Inexpensive
- Quick
- Lower respondent burden
- Can assess current or past diet, can be repeated to gain measure of daily variation and improve precision. Respondents are less likely to change eating pattern because of short collection time
- No literacy requirement,
- Applicable for broad populations of different ethnicity,
- Can be conducted successfully either face-to-face or over the phone.



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Cons: Biases can be caused by errors in memory, perception, conceptualization of food portion sizes, presence of observer.

(Ref: <http://grants.hhp.uh.edu/doconnor/PEP6305/Section%2015.html>)

A three day 24 hour diet recall has been used in this study as all days of the week should be equally represented, or at least weekdays and weekend days should be represented, due to differences in dietary intakes between days of the week.

FOOD FREQUENCY QUESTIONNAIRE: Food frequency questionnaires (FFQ) are designed to assess habitual diet by asking about the frequency with which food items or specific food groups are consumed over a reference period (e.g. 6 months or a year).

Pros

- Low respondent burden - typically take 10-20 minutes to complete.
- Comparatively easy to administer and is low cost compared to other dietary assessment methods
- Used to assess habitual consumption over an extended period of time.
- Can be used to gather information on a range of foods or designed to be shorter and focus on foods rich in a specific nutrient or a particular group of foods e.g. fruit and vegetables.
- Portion size estimates can be used to obtain absolute nutrient intakes.
- Separate sections can be included that ask about consumption of seasonal items, cooking and preparation methods and additions to foods, including sauces and condiments.
- The standardisation of responses enables FFQs to be analysed relatively quickly.

Cons

- A comprehensive list of all foods eaten cannot be included and reported intake is limited to the foods contained in the food list.
- Accurate reporting relies on respondent memory.
- Bias may be introduced with respondents reporting eating 'good' foods more frequently (over-estimation) or the consumption of 'bad' foods less often (under-estimation).
- Estimating portion sizes may be difficult and the use of small, medium and large to describe portion size may not have a commonly accepted meaning.
- Self-administered FFQs may not be completed fully; some respondents may only complete the questionnaire for items they are familiar with.
- FFQs developed in one country or for a specific subpopulation are unlikely to be appropriate for use in another country unless dietary habits are very similar.
- Grouping of foods into individual items may make answering some questions problematic.

(Ref:<http://dapa-toolkit.mrc.ac.uk/dietary-assessment/methods/food-frequency-questionnaire/index.html>).

In this study food frequency questionnaire aimed to assess the food items or specific food groups consumed over a particular period of time. The FFQ was given to the subjects to find out the frequency of consumption of junk/ fried/ fast foods, alcohol consumption, fruits and vegetables, artificial sweeteners, non-veg foods etc.

KNOWLEDEGE AND ATTITUDE: It basically consisted of general information which a woman should be aware during pregnancy. Few questions were asked to which samples had to respond in yes or no. It mainly revolved around the eating habits and their knowledge about food groups on how important they are during pregnancy, spacing between two children, exercising for normal delivery etc.

A tool of nutrition education for pregnant women was designed which consisted of:

- The serving size of different food groups according to RDA were worked on.
- Importance of Food pyramid was described to the Pregnant women, like:
- Cereals – how many servings are required/day (high or low glycaemic foods, sugars)
- Fiber (soluble or insoluble)
- Fat (SFA, TG, MUFA, PUFA etc)
- Non- vegetarian products (Lean meats)
- Milk and milk products (As they are Calcium rich)
- Colourful Fruits and vegetables, Green leafy vegetables (Good source of Vitamins & Minerals)
- Vitamin A rich foods – coloured vegetables



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- Encourage consumption of nutritional supplements (folic acid, iron, calcium, protein etc)
- Physical activity of pregnant women
- Spacing between 2 pregnancies.

STUDY DESIGN

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 group for the study were the patients from few of the city hospitals / nursing home; Private Hospitals/ Nursing Homes like Ark Hospital, Juhu; Enclave Maternity, Goregaon; and Government Maternity Home- Savitribai Phule in Goregaon East. 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.

INCLUSION CRITERIA AND EXCLUSION CRITERIA: Inclusion and exclusion criteria help researchers to find the most suitable candidates to participate in the study. Every study requires that researchers establish and adhere to research protocols in order to yield the best results. Participants cannot be included in the study without satisfying a study's inclusion and exclusion criteria first. (Optimed Research Ltd- Understanding inclusion and exclusion criteria, 2012)

INCLUSION CRITERIA: Inclusion criteria are characteristics that the prospective subjects must have if they are to be included in the study. Women in their 2nd trimesters of pregnancy were included in this study. As many patients enrol themselves usually after 1st trimester. Also the nutrient demand increases by 350 calories in 2nd trimester and it is the most important stage of pregnancy.

Maternal dietary factors may influence outcomes of pregnancy, such as length of gestation, foetal growth, birth defects, pre-eclampsia, and of childhood such as cognitive development, blood pressure, adiposity and atopic disease. Maternal diet may influence outcomes of pregnancy and childhood. Diet in the first trimester may be more important to development and differentiation of various organs, whereas diet later in pregnancy may be important for overall foetal growth as well as for brain development. Women might change their dietary intake patterns during pregnancy after they learn that they are pregnant, after they receive counselling at their initial prenatal visit, or because nausea or vomiting tends to resolve after the 1st trimester. (Rifas S S L. et al, 2006)

EXCLUSION CRITERIA: Exclusion criteria are those characteristics that disqualify prospective subjects from inclusion in the study. Women who have In Vitro Fertilization, or women in their 1st or 3rd trimester we're not be included in this study. IVF patients have their other complications hence were excluded. Maximum patients don't visit the midwife or doctor in their 1st trimester and not many changes in nutrition intake can be done in 3rd trimester hence even they were excluded.

STATISTICAL METHODS

Analyses were performed using SPSS software for Windows (version 16.0, 2007, SPSS Inc, Chicago, IL). Data are presented as Mean \pm SD. Independent sample T test was used to analyse 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. Pearson's correlation was used to find correlations between various parameters. P-value < 0.05 was considered to be statistically significant.

RESULTS AND DISSCUSSIONS

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

FOOD HABITS AND INTAKE: Off the 100 women, 28 were vegetarian, 63 were non-vegetarian and 9 were ovo-vegetarian. Number of meals & snacks consumed per day by pregnant women was analyzed. Off the 100 women, 57% women consumed 2 meals per day whereas 43% women consumed 3 meals per day. When number of snacks

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was evaluated, 3% women consumed no snacks per day, 10% women consumed 1 snack per day, 56% women consumed 2 snacks per day, 26% women consumed 3 snacks per day, 3% women consumed 4 snacks per day and 2% women consumed 2 snacks per day. Figure 1 illustrates number of meals and snacks consumed by women when classified according to hospital type. There was a significant association of number of meals ($\chi^2=14.729$) and number of snacks ($\chi^2=18.415$) and type of hospital with women from private hospitals consuming more meals and snacks as compared to government hospital ($p<0.05$) (Figure 1).

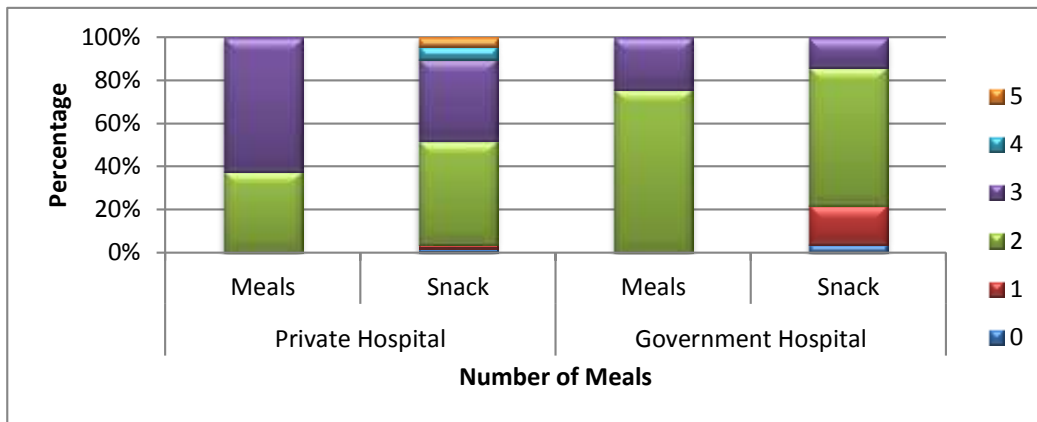


Figure 1: Number of meals & snacks per day consumed by pregnant women according to type of hospital

Data presented as percentage

Better meal planning and lifestyle modification in pregnant women was seen to be associated with reduced risk of metabolic syndromes during and after the pregnancy of the subjects. The meals shall be well planned and at equal intervals which was necessary to avoid binge eating at one time (Castorino et al, 2011).

Pregnant women are reported to have altered appetite and thus information regarding appetite of women was collected. 42% women reported to have increased appetite, 21% reported that they had normal appetite and 37% said they had no appetite. Figure 2 gives details of appetite of pregnant women according to hospital type. There was a significant association of appetite and type of hospital with higher percentage of women from private hospitals having higher appetite and higher percentage of women from government hospitals having decreased appetite ($\chi^2=12.906$, $p=0.002$).

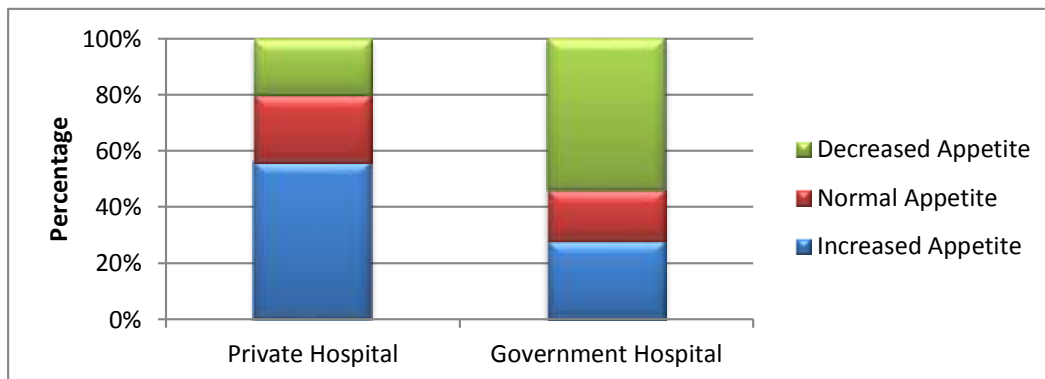


Figure 2: Appetite of pregnant women according to hospital type

Data presented as percentage

DIFFICULTIES IN FOOD CONSUMPTION: In normal pregnancy the leptin access to the brain is increased which increases the feeling of hunger at regular intervals (Ladyman, et al, 2012). Thus increase in pregnancy was considered to be normal and those who did not feel enough hungry was considered to be because of eating difficulties.

Data regarding the eating difficulties experienced by pregnant women across the two groups with respect to cereals, dal/soya, animal products, fruits, vegetables and milk and milk products was collected. When the difficulties were evaluated, 22% reported difficulty eating cereals, 21% reported difficulty eating soya, 5% reported difficulty eating animal products, 18% reported difficulty eating fruits, 8% reported difficulty eating vegetables and 22% reported difficulty eating milk and milk products. Table 1 gives difficulties experienced when classified according to hospital type. There was no significant difference in the percentage of women experience various difficulties in eating when classified according to hospital type ($p>0.05$) (Table 1).

Table 1: Difficulties in food consumption of pregnant women according to type of hospital

Criteria	Private Frequency (Percentage)	Government Frequency (Percentage)	Chi square value	P value
Cereals	14 (28)	8 (16)	2.098	0.148
Dal/soya	11 (22)	10 (20)	0.060	0.806
Animal products	2 (4)	3 (6)	0.211	0.646
Fruits	12 (24)	6 (12)	2.439	0.118
Vegetables	4 (8)	4 (8)	0.000	1.00
Milk and milk products	13 (26)	9 (18)	0.932	0.334

Data presented as frequency (percentage)

The women expressed problems with dietary changes, but they could mostly manage them on their own. The pregnant women experienced that the midwives gave dietary information and advice first when problems arise. When struggling with diet, the women experienced confusion, and they had to seek information by themselves and thus they had difficulty in eating normal food as explained in the above table.

Consumption of milk and milk products was seen to increase the rate of nausea and vomiting while eating cereal, meat and meat products was seen to be associated with increased complaints of heartburn and acidity (Wennberg et al, 2013).

NUTRIENT INTAKE: Nutrient intake of the pregnant women was calculated using 3 day diet recall. The mean energy intake was 996 ± 317 kcal/day, protein intake was 46.9 ± 16.8 g/day, fats were 33.4 ± 9.8 g/day and carbohydrate intake was 154.6 ± 60.2 g/day. Table 2 gives dietary intake of pregnant women when classified according to hospital type. Pregnant women visiting private hospital had significantly higher nutrient intake as compared to those visiting government hospital ($p<0.05$) (Table 2)

Table 2: Nutrient intake of pregnant women according to hospital type

	Private	Government	P value
Energy (kcal/day)	1281 ± 176	711 ± 81	0.001
Protein(g/day)	55.4 ± 16.3	38.5 ± 12.4	0.001
Fats(g/day)	40.6 ± 7.1	26.1 ± 5.9	0.001
CHO(g/day)	201.6 ± 50.6	107.6 ± 15.5	0.001



Data presented as Mean±SD

The recommended daily allowed intake for pregnant women according to Gopalan et al, (2010), was found to be 2250 kcal of energy, 55-78 g of protein, and 30 g of fats and 175 g of CHO. The subjects in the current study were seen to consume very less amount of energy in both the groups than the recommended quantity. The consequences of this could be malnutrition in mothers and low gestational weight of the babies. The protein intake was seen to be very low in the government hospital subjects and within range but on the lower side in the subjects from the private hospitals. The deficiency of protein could lead to birth defects in the babies. The fat consumption was seen to be high in the subjects from the private hospital and low in the government hospital subjects both of which was seen to be correlated to birth defects and unhealthy child birth.

KNOWLEDGE AND ATTITUDE: Knowledge and attitude of women regarding various aspects of nutrition and pregnancy was evaluated. Off the 100 pregnant women, 29% skipped meals, 13% left home without having breakfast, 4% work timings affected their decision about what they ate, 41% are food from outside in case they are late or unable to cook, 33% carried snacks to work or when they go out, 72% consumed fruits, 22% consumed ready to cook snacks, 44% women's food choice was influenced by advertisements, 69% knew what that nutrient needs increase from 2nd trimester, 16% were aware of how many servings of cereals, pulses, fruits vegetables, milk & its products, meat etc that they should eat in a day, 64% consumed coconut water, 85% consumed milk and milk products, 84% consumed colorful fruits and vegetables and leafy vegetables, 80% knew importance of exercise for normal delivery and 70% knew that spacing between 2 pregnancies is important. Table 3 presents knowledge and attitude of pregnant women when classified according to hospital type. As seen in Table 3, significantly higher percentage of women from private hospitals carried snacks to work or when they go out, knew what that nutrient needs increase from 2nd trimester, were aware of how many servings of cereals, pulses, fruits vegetables, milk & its products, meat etc that they should eat in a day and consumed coconut water as compared to women from government hospitals ($p < 0.05$) (Table 3).

Table no. 3 Knowledge and attitude of pregnant women according to hospital type

Criteria	Private Frequency (Percentage)	Government Frequency (Percentage)	Chi square value	P value
Do you skip any meal?	14 (28)	15 (30)	0.049	0.826
Do you leave home without having breakfast?	4 (8)	9 (18)	2.210	0.137
Do your work timings affect your decisions about what you eat?	2 (4)	2 (4)	0.000	1.000
Do you eat food from outside in case you're late or unable to cook?	26 (52)	15 (30)	5.002	0.025
Do you like carrying snacks to work or when you go out?	25 (50)	8 (16)	13.070	0.000
Do you take fruits in your diet?	25 (50)	37 (74)	0.198	0.656
Do you take ready to cook snacks in your diet?	7 (14)	15 (30)	3.730	0.053
Does advertisement influence your food choices?	21 (42)	23 (46)	0.162	0.687
Do you know that your nutrient need increases from 2 nd trimester?	40 (80)	29 (58)	5.657	0.017
Do you know how many servings of cereals, pulses, fruits vegetables, milk & its products, meat etc in a day you should eat?	15 (30)	1 (2)	14.580	0.000



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Do you consume coconut water?	43 (86)	21 (42)	21.007	0.000
Do you consume any milk and milk products?	43 (86)	42 (84)	0.078	0.779
Do you eat colourful fruits and vegetables?	41 (82)	43 (86)	0.298	0.585
Do you eat dark green leafy vegetables?	42 (84)	42 (84)	0.000	1.000
Do you know the importance of exercise for normal delivery?	37 (74)	43 (86)	2.250	0.134
Do you know that spacing between 2 pregnancies is important?	38 (76)	41 (82)	0.542	0.461

Data presented as frequency (%)

Currie et al, (2009) explained that consumption of fast food and junk food during pregnancy was seen to increase obesity and weight gain beyond required limits and led to associated risks.

The nutrient need was seen to be increased in the subjects during pregnancy. The awareness about the same was considered to be crucial. The subjects who were unaware of this were seen to develop malnutrition and deficiency syndromes which led to birth defects in the subjects (Abu Saad and Fraser, 2010).

The subjects from the private hospital in the present study conducted were seen to be more aware of the importance of increase in number of servings of food during pregnancy.

In a study by Shiman et al, (2009), the researcher explained that during pregnancy it is necessary that the subjects eat more number of servings at well spaced intervals. The benefit of this was ascertained to be improvement in dietary quality and not flooding with food at one time and eating small servings a number of times.

The subjects were seen to be consuming coconut water and were also aware of the benefits of the same. There was increasing scientific evidence that supports the role of coconut water in health and medicinal applications in pregnant as well as other populations. Coconut water which was traditionally used as a growth supplement is also a great source of sugars, vitamins, minerals, amino acids and phyto hormones which are essential for proper physical and mental development.

Other knowledge and attitude parameters that were seen to be more prominent in the subjects from the private hospitals, the subjects from the government hospital were not much aware of the importance of gap between two pregnancies. This was considered to be an area of concern as not planning to consequent pregnancies was seen to be related to complications and health defects in the mothers as well as the child.

The study by Sonefield et al, (2014) also gave similar results and explained that a mother's body needs 2 years to fully recover from nutritional and physical stress after each pregnancy and childbirth. The second child was also seen to be healthier if the gap is of at least 2 years between the pregnancies as immediate birth of two babies was seen to be giving increased risk of autism and other mental disorders in the second child. The importance of exercise and normal delivery was also studied among the subjects in the present study conducted.

More of private hospital subjects were seen to be aware of this. Unawareness about this was considered to be crucial. Lack of exercise during pregnancy was seen to be leading to complication and difficulty at the time of delivery in the subjects who were involved in sedentary activities (Barkat R 2009). Exercise training in pregnancy also reduces offspring size without changes in maternal insulin sensitivity and improved the metabolic activity in the mothers. It also helps the mothers to regain their normal weight and improve health post delivery (Hopkins et al, 2010).



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