IMAPCT OF DIETARY PATTERN ON NUTRITIONAL STATUS OF PREGNANT WOMEN IN LOW AND HIGH STRATA BETWEEN THE AGE GROUP OF 30-39 YEARS IN MUMBAI

ABSTRACT

BACKGROUND

Maternal Nutrition plays an important role in shaping the mother's and fetal health. Therefore intake of High salt, High fat, High sugar in the diet might lead to Over nutrition among pregnant women due to varied food choices of the since most of the subjects consumed outside food, Sugar Sweetened Beverages such as (Cola, Pepsi, Thumps Up, Soda, Sherbet etc), Processed Food such as(Ready to eat food, Mayonnaise, Cheese spread etc) which consist of increase amount of preservative which might affect the mother and foetal's health. Since there was increase intake of above food groups and decrease intake of macro and micronutrients in the diet through food group such as Fruits, Nuts and Oilseed, Green Leafy Vegetables etc. Therefore there might be increased risk of Over nutrition among women which might lead to GDM(Gestational Diabetes Mellitus), IUGR(Intra Uterine Growth Retardation), Low Birth weight etc.

AIM

To study the impact of dietary pattern on Nutritional of pregnant women in Low and High Strata

METHOD

A purposive random sampling was done among pregnant women because only 2nd trimester pregnant women were selected for the study. The 50 subjects were divided into LSES (Lower Socioeconomic Strata) &HSES (Higher Socioeconomic Strata) on the basis of Kuppuswamy Index. The dietary pattern of the subjects was assessed through FFQ (Food Frequency Questionnaire) & 3 Day Diet Recall.

RESULT

There was increase consumption of High Fat, High Salt, High Sugar in the diet through consumption if food group such as Outside Food, Processed Food, Sugar Sweetened Beverages etc and in comparison the consumption of Macro and Micronutrient rich food group was lower which included Fruits, Green Leafy Vegetables, Nuts and oilseed etc. In Lower Strata the consumption of above food group was low because they were financially not stable therefore they were given additional services where the company paid their ration balance so that they could consume selective food group which were costing comparatively more. Since the RDA(Recommended Dietary Allowances) requirements were not met therefore the women were prescribed Iron, Calcium and Folic Acid supplements in the diet to decrease the risk of Maternal and fetal complication such as GDM(Gestational Diabetes Mellitus), NTD(Neural Tube Defect), IUGR(Intra Uterine Growth Retardation) etc.

CONCLUSION

Therefore to decrease the risk of Maternal and Fetal Complications intake of Macro and Micronutritions in the diet is imperative and it is important to organize Nutrition Intervention programmes and counsel the pregnant women about Maternal Nutrition and how decrease intake of Nutrients in the diet might lead to Maternal Under nutrition and Over nutrition and its related risk.

Keywords: Over nutrition, Micronutrient Deficiencies, GDM (Gestational Diabetes Mellitus) IUGR (Intra Uterine Growth Retardation) and Nutrition Intervention Programme.

INTRODUCTION

Maternal obesity or over nutrition before or during pregnancy might result in fetal growth restriction and increased risk of neonatal mortality and morbidity in humans (Bazer et.al, 2004). Maternal obesity increases the risk for spontaneous abortion, unexplained stillbirth, preeclampsia and Gestational Diabetes Mellitus. It was also observed that it might increase the risk of abnormal fetal growth. Fetal macrosomia (defined as an estimated fetal weight of greater than or equal to 4500 g), which might appear to be increased by 2- to 3-fold in obese parturients. The risk of fetal macrosomia was more among obese women with prevalence rates of fetal macrosomia at 13.3% and 14.6% for obese and morbidly obese women, respectively, compared

with 8.3% for the normal weight control group. Fetal macrosomia in obese women was associated not only with an increase in the absolute size of the fetus, but it might also lead to a change in body composition. The average fat mass of infants born to mothers with a normal BMI (< 25 kg/m^2) was 334 g and the infant born to women with a BMI > 25 kg/m^2 had a mean fat mass of 416 g. It had led to an increased risk of Neural Tube defect where a 1 kg/m^2 increase in BMI was associated with a 7% increased risk of having an infant with NTD (Neural Tube Defect) due to reduction in the amount of folic acid reaching the developing embryo due to insufficient absorption and greater maternal metabolic demands, chronic hypoxia, and increased circulating levels of triglycerides, uric acid, estrogen, and insulin (due, in part, to increased insulin resistance). Sugar-sweetened beverages (SSB) are drinks with added sugar including: non-diet soft drinks/sodas, flavored juice drinks, sports drinks, sweetened tea, coffee drinks, energy drinks, and electrolyte replacement drinks. The calories in sugar sweetened beverages can contribute to weight gain and provide little to no nutritional value. Sugar-sweetened beverages do not fill you up the same way that food does. Those extra calories can lead to other health risks including obesity, tooth decay, heart disease and type 2 diabetes. Consumption of SSB >5 servings/week showed 22% increased risk of GDM among women due to presence of AGE of in the drink which lead to insulin resistance and Inflammation in the body.(Chen et.al,2009). Some evidence from biochemical studies among populations with high marine-food intakes suggesting that higher intakes of long-chain omega-3 fatty acids during pregnancy might result in an increased duration of gestation and might also improve fetal growth (Frazer et.al, 2010). Participants who had consumed fried foods more than four times/week had a 37% higher risk of developing overweight/obesity in comparison with those who had consumed fried foods less than twice/week. during frying which leads to oxidation, hydrogenation and this leads to loss of linoleic and linoleic acid and an increase in Trans fatty acid, which will lead to reduce insulin sensitivity and increased risk of Type 2 diabetes. (Bao et.al, 2014). Inadequacy of micronutrients intake was also typical of obese “western” diets, poor of vegetables and fruit. Indeed, over-nourished women were often malnourished, with macro- and/or micronutrients imbalances potentially affecting fetal growth (Laroeti et.al, 2015).

Overweight and obesity might result from an imbalance between energy consumed (too much) and energy expended (too little). Overweight and obesity during pregnancy might lead to various

risks such as Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy, pre-eclampsia, still birth, fetal macrosomia, Cesarean delivery etc. (WHO, 2018). Deficiencies of micronutrients such as vitamin A, iron, iodine and folate were particularly common among during pregnancy, due to increased nutrient requirements of the mother and developing fetus. These deficiencies might negatively impact the health of the mother, her pregnancy, as well as the health of the newborn baby. The most current evidence showed that giving multiple micronutrient supplements to pregnant women might reduce the risk of low birth weight and of small size for gestational age, compared with iron and folic acid supplementation alone (www.who.org).

METHODOLOGY

A. **Sampling:** The target group for the project was pregnant women who belonged to 2nd Trimester. A purposive sampling technique was used to select the participants for the study. A total of 50 samples of pregnant women in the age group of 30-39 years were selected from the Malhar Maternity and General Nursing Home, Mumbai.

B. Kuppuswamy Index: This is the most commonly used scale for determining the SES of an urban family. Kuppuswamy scale was developed for assessing the SES of an urban individual. It took three parameters into account, namely, education, occupation, and income of the individual. It was modified to enable SES assessment of a family rather than an individual. The parameters were modified as education and occupation of the HOF (Head of the family) and the income of the whole family, pooled from all the sources.

Education of head of family	Score	Occupation of head of family	Score	Total per capita family income per month (as given originally in 1976)	Score
Professional degree	7	Professional	10	2000 and above	12
Graduate	6	Semi profession	6	RS 1000-1999	10
Intermediate/diploma	5	Clerical/shop/farm	5	RS 750–999	6
High school	4	Skilled worker	4	RS 500–749	4
Middle school	3	Semiskilled worker	3	300-499	3
Primary school	2	Unskilled worker	2	RS 101–299	2
Illiterate	1	Unemployed	1	Less than RS 100	1

The total score is calculated by adding up all the three scores, namely, education, occupation, and total family income. According to the total score thus calculated, the family is placed in the appropriate socioeconomic class as explained in the following.

C. **Food Frequency Questionnaire**: FFQs assesses the frequency with which foods and/or food groups were eaten over a certain period of time. The questionnaire includes a food list i.e. Consumption of Outside food, bakery food, Sweets, Sugar Sweetened Beverages, Cereals, pulses, Dairy Products etc. which was either Less than 1 time per month, 1-3 times per month, 1-3 times per week, 4-6 times per week & 1 time per day. . A frequency category section, and can be self- or interviewer- administered.

D. **3 Day Diet Recall**: 3 Day 24 hour Dietary Recall was taken on 2 weekdays and 1 weekend day. During a 3day 24- hour recall, respondents that is pregnant women were asked, to recall and report foods and beverages of all meals consumed over the preceding 24 hours and 24-hour period starts with the first thing eaten by the respondent in the morning until the last food item consumed before she got up the next morning. Each and every detail of food must be assessed like time i.e what time it was eaten , what food was consumed either homemade food or outside food , what was the ingredient added to that meal , how much ml /l of water , milk was consumed , what was the quantity of the packaged foods consumed , how much oil was used in the whole day , how many meals were skipped , note any other beverages were consumed , note down and specific food allergy ,how was the meal prepared and midnight cravings so that it will

be easy to calculate energy and other nutrients and help in assessing the nutritional status of the respondent.

RESULT

NUTRITIVE VALUE

1. ENERGY

Table 1: Paired Sample Statistic for Energy Consumption

	Socioeconomic Strata	No of Samples	Mean ± Std. Deviation	t-test	Sig(2-tailed)
ENERGY Kcal	Lower Socioeconomic Strata (LSES)	21	1497 ± 293	1.12	.265
	Higher Socioeconomic Strata (HSES)	29	1586 ± 261		

Table 1 demonstrated that in Lower Socioeconomic Strata (LSES) and Higher Socioeconomic Strata (HSES) the energy consumption did not meet the Recommended Dietary Allowances (RDA) . It was observed that the consumption of energy in both the strata was more in the form of empty calories (such as Fried Food, Sweets, SSB etc) and the energy consumption through homemade food was comparatively lower in both the strata. Table 1(a) illustrates that the mean pre-energy consumption in LSES was 1497±293kcal and in HSES was 1586±261kcal. There was no significant difference observed in both the strata (LSES & HSES) at p=0.05(p=.265).

2. PROTEIN

Table 2: Paired Sample Statistics for Protein Consumption

	Socioeconomic Strata	No of Samples	Mean ± Std. Deviation	t-test	Sig(2-tailed)
PROTEIN (gm)	Lower Socioeconomic Strata (LSES)	21	46.7 ± 12.6	.598	.553
	Higher Socioeconomic Strata (HSES)	29	44.6 ± 12.1		

Table 2 demonstrated that in Lower Socioeconomic Strata (LSES) and Higher Socioeconomic Strata (HSES) the protein consumption did not meet the Recommended Dietary Allowances (RDA) requirements. It was observed that there was intake of pulses and Non-Vegetarian foods in the diet by both the strata but the consumption of the protein through the above food groups did not meet the daily requirements and there were selective subjects in the study had completely stopped the consumption of Non-Vegetarian food in the diet due to pregnancy. And the subjects who were vegetarian, the daily consumption of protein was not met as per RDA(Recommended Dietary Allowance) Guidelines because their consumption of pulses was not on daily basis but rather on weekly basis which had led to decrease in intake of protein . Hence the mean protein consumption in LSES was 46.7±12.6gm and in HSES was 44.6±12.1gm and therefore no significant difference was observed at p=0.05 (p=.553).

3. CARBOHYDRATE

Table 3: Paired Sample Statistics of CHO consumption

	Socioeconomic Strata	No of Samples	Mean ± Std. Deviation	t-test	Sig(2-tailed)
CARBOHYDRATE (gm)	Lower Socioeconomic Strata (LSES)	21	160.9 ± 42.5	.056	.955
	Higher Socioeconomic Strata (HSES)	29	160.2 ± 44.2		

Table 3 demonstrated that demonstrated that in Lower Socioeconomic Strata (LSES) and Higher Socioeconomic Strata (HSES) the Carbohydrate consumption as per Recommended Dietary Allowances (RDA) requirements. It was also observed that there was increase consumption of simple CHO in the diet by both the strata through consumption of Bakery food and refined flour in the diet. And the consumption of CHO through other food groups was comparatively lower such as through Vegetables, Fruits, Pulses etc which might provide all the nutritients and vitamins which were important during Pregnancy. Therefore the mean CHO

consumption in LSES was 160.9± 44.2gm and in HSES was 160.2± 44.2gm and hence no significant difference was observed at p=0.05(p=.955).

4. **FAT**

Table 4: Paired Sample Statistics of Fat Consumption

	Socioeconomic Strata	No of Samples	Mean ± Std. Deviation	t-test	Sig(2-tailed)
FAT (gm)	Lower Socioeconomic Strata (LSES)	21	68.1±13.6	1.24	.219
	Higher Socioeconomic Strata (HSES)	29	72.1±8.9		

Table 4 demonstrated that in Lower Socioeconomic Strata (LSES) and Higher Socioeconomic Strata (HSES) the Fat consumption did not meet the Recommended Dietary Allowances (RDA) requirements and the consumption was comparatively higher than RDA. It was also observed that the fat consumption in the diet by both the strata was through Fried food, processed food, Bakery food (Margarine and butter) etc., the consumption of good quality fat by the subjects in both the strata through consumption of Nuts and Oilseed, Fish etc was comparatively lower therefore the consumption of Omega-3 fatty acid, Folic Acid in the diet was low because the consumption of this fatty acid in the diet plays a significant role during pregnancy for the growth and brain development of the foetus. Therefore the mean consumption of Fat in LSES was 68.1±13.6gm and in HSES was 72.1±8.9gm and hence there was no significant difference observed at p=0.05 (p=.219).

5. DIETARY FIBRE

Table5(a): Paired Sample Statistics for Dietary Fibre Consumption

	Socioeconomic Strata	No of Samples	Mean ± Std. Deviation	t-test	Sig(2-tailed)
DIETARY FIBRE(gm)	Lower Socioeconomic Strata (LSES)	21	23.8 ± 7.69	.912	.366
	Higher Socioeconomic Strata (HSES)	29	21.6 ± 8.99		

Table 5 demonstrated that in Lower Socioeconomic Strata (LSES) and Higher Socioeconomic Strata (HSES) the Fibre consumption did not meet the Recommended Dietary Allowances (RDA) requirements. It was also noticed that the consumption of fibre in the diet was at par in both the strata with consumption through Fruits, Vegetables, Pulses etc because the consumption of the above food group by the subjects in both the strata was more on weekly basis than on daily basis, therefore the fibre requirements were not met during pregnancy. The constipation was one of the symptoms during pregnancy but the condition had worsened with decrease fibre intake in the diet and one of the reasons might be due to decrease physical activity among the subjects. Therefore the mean consumption of fibre in LSES was 23.8±7.69gm and in HSES was 21.6±8.99gm and hence no significant difference was observed at p=0.05(p=.366)

6. IRON

Table 6: Paired Sample Statistics for Iron Consumption

	Socioeconomic Strata	No of Samples	Mean ± Std. Deviation	t-test	Sig(2-tailed)
IRON(mg)	Lower Socioeconomic Strata (LSES)	21	18.6±43.5	1.13	.262
	Higher Socioeconomic Strata (HSES)	29	9.41±3.27		

Table 6 demonstrated that in Lower Socioeconomic Strata (LSES) and Higher Socioeconomic Strata (HSES) the consumption of Iron was as per Recommended Dietary Allowances (RDA) requirements. It was also observed that in both the strata the subjects were prescribed Iron Tablets and supplements to meet the requirements since their consumption through diet was lower. The iron requirement through diet was through Vegetables, Green leafy Vegetables, Non-Veg food, Fruits etc. Inspite of the consumption of these foodgroup the requirements were not met and one reason might be that the portion size consumption was not enough because it was comparatively lesser by the subjects belonging to both the strata and there was not sufficient consumption of Vitamin C rich food in the diet which might help in the absorption of Iron in the body. Therefore the mean consumption of Iron in LSES was 18.6±43.5mg and in HSES was 9.41±3.27mg and hence no significant difference was observed at p=0.05(p=.262).

7. CALCIUM

Table 7: Paired Sample Statistics for Calcium Consumption

	Socioeconomic Strata	No of Samples	Mean ± Std. Deviation	t-test	Sig(2-tailed)
CALCIUM(mg)	Lower Socioeconomic Strata (LSES)	21	296.7 ± 93.3	.2.01	.050
	Higher Socioeconomic Strata (HSES)	29	250.8 ± 68.2		

Table 7 demonstrated that in Lower Socioeconomic Strata (LSES) and Higher Socioeconomic Strata (HSES) the Calcium consumption did not meet the Recommended Dietary Allowances (RDA) requirements. It was also observed that the consumption of Dairy Products in both the strata by selective subject was lower due to pregnancy, therefore the subjects12 were prescribed Calcium Supplements to meet the requirements whereas there were selective subjects whose Dairy product consumption was appropriate and therefore the mean consumption of Calcium in LSES was 296.7±93.3mg and in HSES was 250.8±68.2mg and hence there was significant difference observed at p=0.05(p=.050).

8. FOLIC ACID

Table 8:Paired Sample Statistics for Folic Acid consumption

	Socioeconomic Strata	No of Samples	Mean ± Std. Deviation	t-test	Sig(2-tailed)
FOLIC ACID (mcg)	Lower Socioeconomic Strata (LSES)	21	310.5 ± 283.8	.195	.846
	Higher Socioeconomic Strata (HSES)	29	295.5 ± 257.6		

Table 8 demonstrated that in Lower Socioeconomic Strata (LSES) and Higher Socioeconomic Strata (HSES) the Folic Acid consumption did not meet the Recommended Dietary Allowances (RDA) requirements but the consumption was at par with RDA. It was also observed that the consumption of folic Acid through diet in both the strata was comparatively

lower because the subjects consumption of Folic acid rich food such as Fish, Almond, Walnuts, Groundnut etc through diet was negligible and instead there was increase consumption of Red meat in the diet instead of fish which might lead to increase inflammation in the body. Since the requirements couldn't be met therefore the subjects were prescribed Folic Acid Tablets. Therefore the mean consumption of Folic Acid in LSES was 310.5±283.8mcg and in HSES was 295.5±257.6mcg and hence there was no significant difference at p=0.05 (p=.846).

DISCUSSION

Dieatry Pattern was studied and it was observed that there was increase intake of High Fat, High salt, Processed food, Sugar Sweetened beverages etc. in both the stratum. Therefore there might be an increase risk of Over nutrition among High Socioeconomic Strata (HSES)women as compared to Low Socioeconomic Strata (LSES) women because it was the consumption of the above food was more among High Socioeconomic Strata (HSES) subjects because most of the subjects were working women and it was noticed that the inadequate consumption was due to increase social gatherings, corporate meetings etc, Therefore the women among High Socioeconomic Strata (HSES) were advised to carry Tiffin boxes, during meetings carry nuts or replace the choice of food groups in the diet with healthy choices such as Fruits, Nuts, Sprouts etc to meet the nutritional requirements. Since the food choices of this stratum was inadequate therefore the women were prescribed Calcium, Folic Acid and Iron tablets or supplements in the diet .Whereas in Low Socioeconomic Strata (LSES) there might be an increase risk of micronutrient deficiencies because the women were not economically stable to purchase food groups which were rich in Folic acid, Iron and Calcium, therefore the women were advised to consume food groups which were economically within the budget to purchase and meet the nutritional requirements in the diet. And the risk of Undernutrition might be lower because the women of both the stratum belong to urban areas and according to evidence based studies the risk of maternal undernutrition was more among women belonging to rural areas. Hence it was imperative to spread awareness about Maternal Malnutrition and the associated risk such as Gestational Diabetes Mellitus (GDM) Intra Uterine Growth Retardation (IUGR), pre-eclampsia, Macrosomia etc. Therefore inadequate dietary intake might lead to the above pregnancy risk among women of both the stratum.

CONCLUSION

Dietary Intake might play an imperative in decreasing the risk of Maternal Malnutrition. This can be decreased by spreading awareness through Nutrition Intervention Programmes about Maternal Malnutrition and how through consumption of macro and micronutrients through diet in the right portion might meet the requirements and decrease the associated complications of Undernutrition and Overnutrition during pregnancy.

CONSENT

A written consent had been collected from the Malhar Maternity & General Nursing Home with the approval by the concerned Gynecologist to make sure that she had no issues in letting her patients participate in the study.

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