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. The decrease intake of Macro and Micronutrients in the diet might lead to an increase in pregnancy complications which might hamper the fetus life. Increase consumption of High Fat, High Salt, Processed Food, Bakery Food, Sugar Sweetened Beverages etc might increase the risk of Over nutrition (Obesity) among women whereas a decrease intake of micronutrients in the diet might lead to micronutrient deficiencies such as decrease intake of Iron, Calcium and Folic Acid rich food through diet might lead to fetal complications such as Neural Tube Defect, IDA (Iron Deficiency Anemia), IUGR (Intra Uterine Growth Retardation) etc. Therefore intake of all the nutrients in the diet is imperative to decrease the risk of pregnancy complications for future.

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. The 50 subjects were divided into LSES &HSES on the basis of Kuppuswamy Index. The dietary pattern of the subjects was assessed through FFQ (Food Frequency Questionnaire) & 3 Day Diet Recall.

RESULT

The result showed that the frequency consumption of High Fat, High Salt, Processed Food, Sugar Sweetened Beverages, and Sweets etc in the diet was higher in both the stratum. Whereas the consumption of Cereals, Pulses, Fruits, and Vegetables in the diet was comparatively lower therefore the Macro and Micronutrients in the diet did not meet the RDA (Recommended Dietary

Allowances) requirements. Therefore there might be increased risk of Micronutrient deficiencies where decrease intake of Iron, Folic Acid and Calcium rich food in the diet might lead to increase fetal complications such as Neural Tube Defect(NTD), IUGR(Intra Uterine Growth Retardation), IDA(Iron deficiency Anemia etc.

CONCLUSION

To improve the dietary intake of pregnant women during pregnancy it is imperative to organize Nutrition Intervention Programmes and spread awareness about the increased risk of Maternal Malnutrition and the associated risk.

Keywords: Over nutrition, Micronutrient Deficiencies, NTD (Neural Tube Defect), IUGR (Intra Uterine Growth Retardation) and IDA(Iron Deficiency Anemia).

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)**.** It was also observed that it might increase the risk of abnormal fetal growth. Fetal which might appear to be increased by 2- to 3-fold in obese patients. 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) (Leddy 2008). 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 GDM, 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 30-45 years were selected from the Malhar Maternity and General Nursing Home, Mumbai.

B. **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.

C. **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: Comparison of Energy Requirements in LSES and HSES with RDA

SOCIOECONOMIC STRATA	ENERGY(Kcal)	RDA(2010)
LSES	1498kcal	2250kcal
HSES	1587kcal	

Table 1(a): Paired Sample Statistic for Energy Consumption

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

Fig:1: Graphical Representation of comparison of Energy Requirements in LSES & HSES with RDA

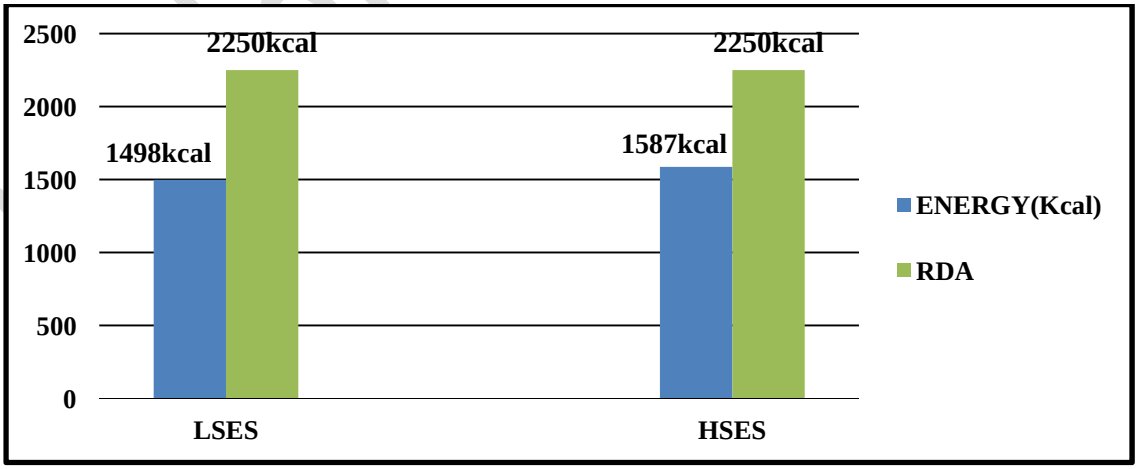

Fig 1 demonstrated that in LSES and HSES the energy consumption did not meet the RDA (Recommended Dietary Allowances). It was observed that the consumption of energy in both the strata was more in the form of empty calories (such as Fried Food, Sweets, SSB etc) and the energy consumption through homemade 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: Comparison of Protein Requirements in LSES and HSES with RDA

SOCIOECONOMIC STRATA	PROTEIN(gm)	RDA(2010)
LSES	47g	82.2g
HSES	45g	

Table 2(a): Paired Sample Statistics for Protein Consumption

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

Fig 2: Graphical Representation of Comparison of Protein Requirements in LSES & HSES with RDA

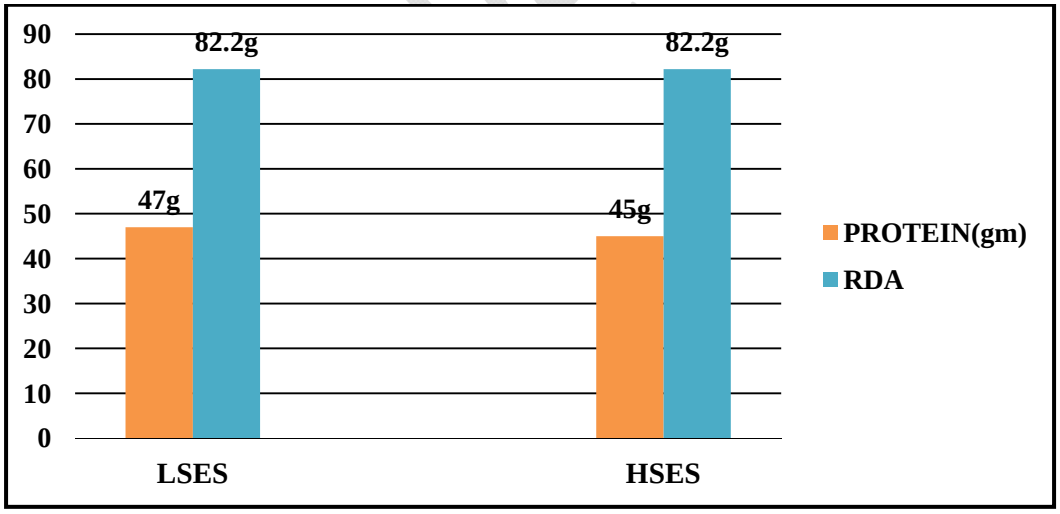

Figure 2 demonstrated that in LSES and HSES the protein consumption did not meet the RDA (Recommended Dietary Allowances) requirements. It was observed that there was intake of pulses and Non-Vegetarian foods in the diet by both the strata but the consumption of the protein through the above food groups 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: Comparison of CHO Requirements in LSES and HSES with RDA

SOCIOECONOMIC STRATA	CARBOHYDRATE(gm)	RDA(2010)
LSES	160.9g	309.3g
HSES	160.4g	

Table 3(a): Paired Sample Statistics of CHO consumption

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

Fig 3: Graphical Representation of Comparison of Carbohydrate Requirements in LSES & HSES with RDA

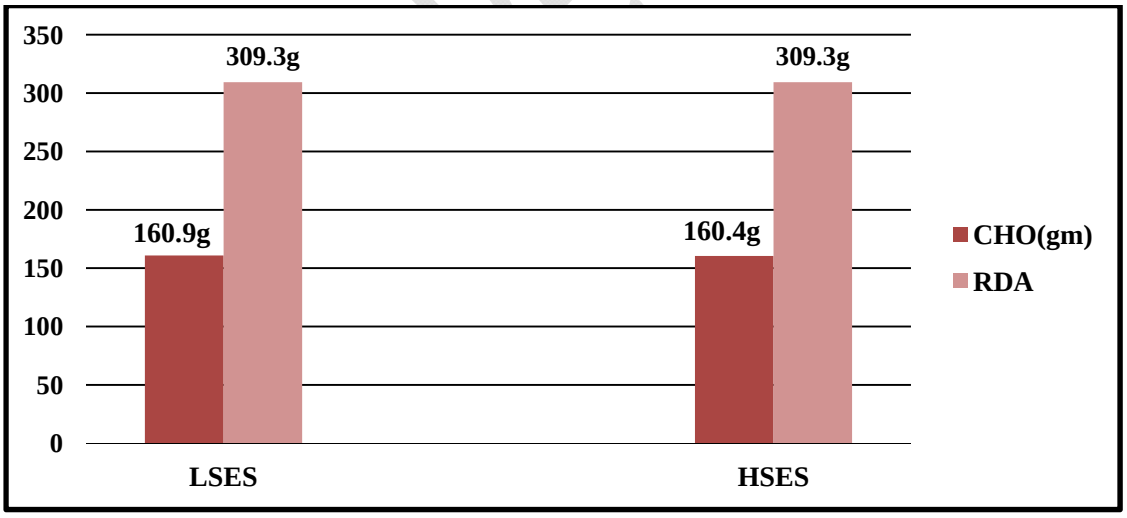

Fig 3 demonstrated that demonstrated that in LSES and HSES the Carbohydrate consumption as per RDA (Recommended Dietary Allowances) requirements. It was also observed that there was increase consumption of simple CHO in the diet by both the strata through consumption of Bakery food and refined flour 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: Comparison of Fat Requirements in LSES and HSES with RDA

SOCIOECONOMIC STRATA	FAT(gm)	RDA(2010)
LSES	68.1g	50g
HSES	72.2g	

Table 4(a): Paired Sample Statistics of Fat Consumption

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

Fig4: Graphical Representation of Comparison of Fat Requirements in LSES & HSES with RDA

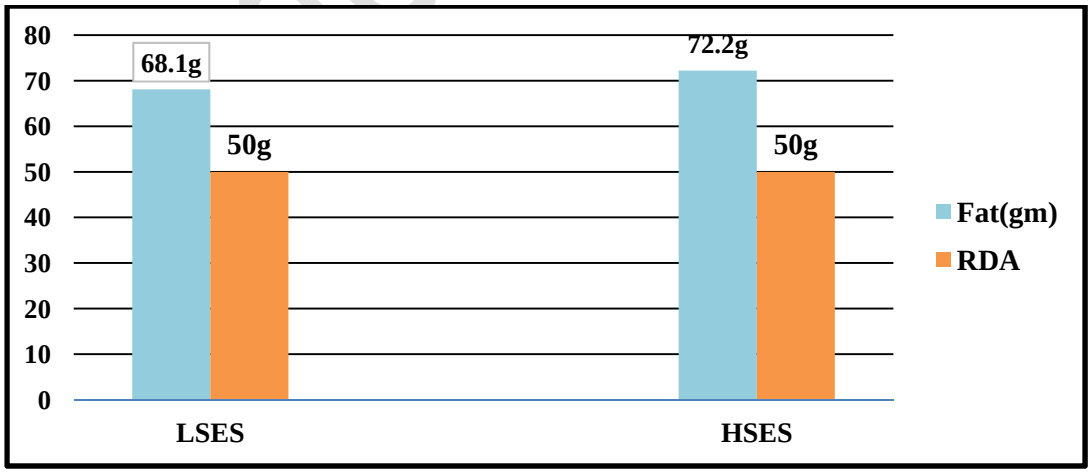

Fig 4 demonstrated that in LSES and HSES the Fat consumption did not meet the RDA (Recommended Dietary Allowances) requirements and the consumption was comparatively higher than RDA. It was also observed that the fat consumption in the diet by both the strata was through Fried food, processed food, Bakery 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

Table 5: Comparison of Dietary Fibre Requirements in LSES and HSES with RDA

SOCIOECONOMIC STRATA	DIETARY FIBRE(gm)	RDA(2010)
LSES	23.6g	28g
HSES	21.8g	

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

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

Fig 5. Graphical Representation of Comparison of Dietary Fibre Requirements in LSES & HSES with RDA

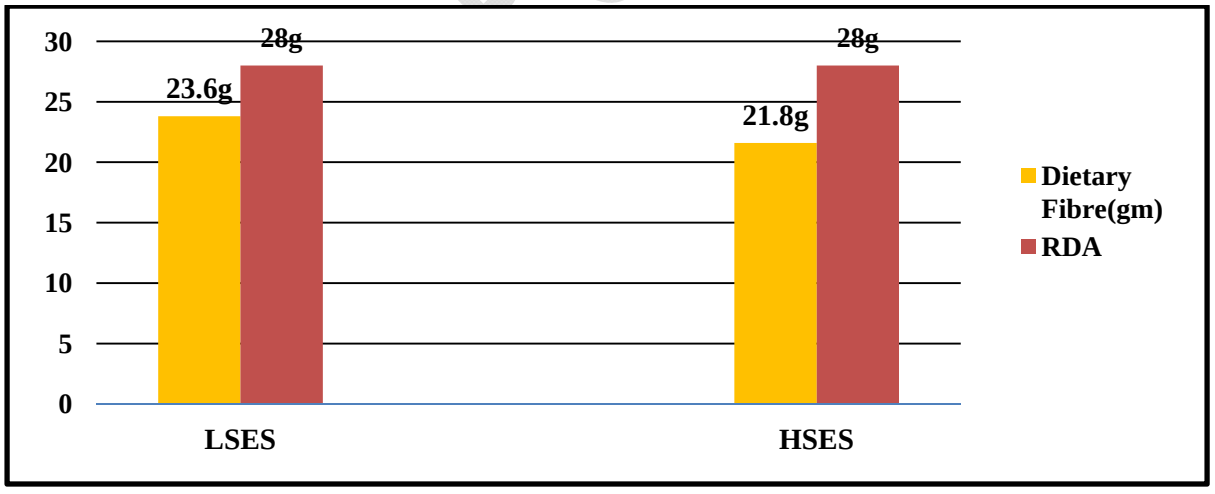

Fig 5 demonstrated that in LSES and HSES the Fibre consumption did not meet the RDA (Recommended Dietary Allowances) requirements. It was also noticed that the consumption of fibre in the diet was at par in both the strata with consumption through Fruits, Vegetables, Pulses etc because the consumption 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: Comparison of Iron Requirements in LSES and HSES with RDA

SOCIOECONOMIC STRATA	IRON(mg)	RDA(2010)
LSES	18.6mg	35mg
HSES	9.3mg	

Table 6(a): Paired Sample Statistics for Iron Consumption

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

Fig 6.Graphical Representation of Comparison of Iron Requirements in LSES & HSES with RDA

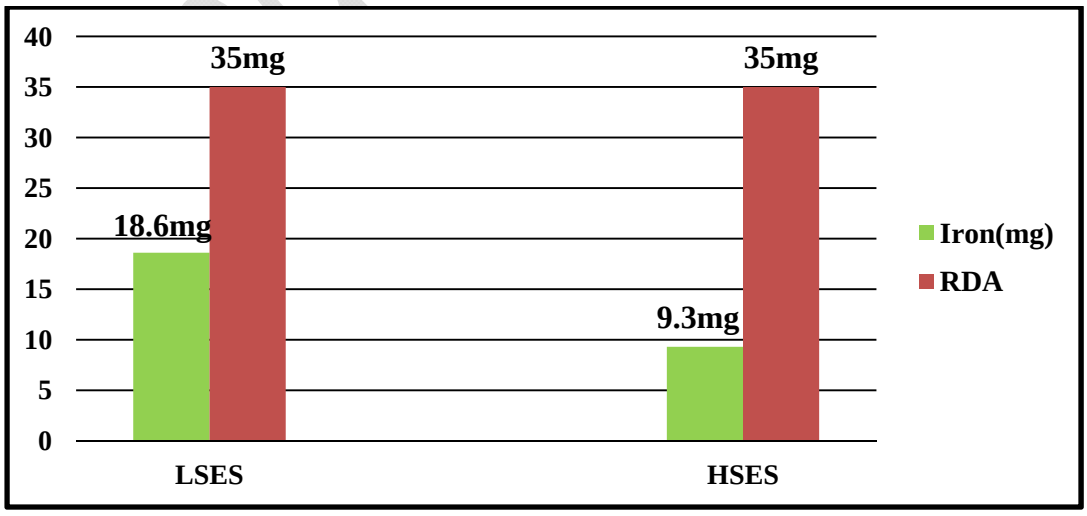

Fig 6 demonstrated that in LSES and HSES the consumption of Iron was as per RDA (Recommended Dietary Allowances) requirements. It was also observed that in both the strata the subjects were prescribed Iron Tablets and supplements to meet the requirements since their consumption through diet was lower. 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. Comparison of Calcium Requirements in LSES and HSES with RDA

SOCIOECONOMIC STRATA	CALCIUM(mg)	RDA(2010)
LSES	298mg	1200mg
HSES	260mg	

Table 7(a): Paired Sample Statistics for Calcium Consumption

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

Fig 7: Graphical Representation of Comparison of Iron Requirements in LSES & HSES with RDA

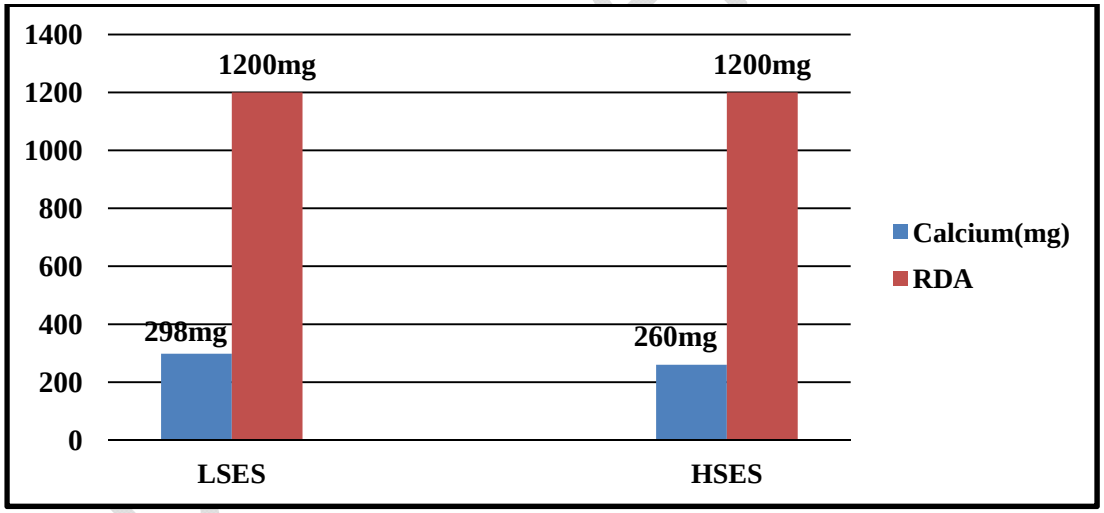

Fig 7 demonstrated that in LSES and HSES the Calcium consumption did not meet the RDA (Recommended Dietary Allowances) requirements. It was also observed that the consumption of Dairy Products in both the strata by selective subject was lower due to pregnancy, therefore the subjects12 were prescribed 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: Comparison of Folic Acid Requirements in LSES and HSES with RDA

SOCIOECONOMIC STRATA	FOLIC ACID(mcg)	RDA(2010)
LSES	310.5mcg	600mcg
HSES	300mcg	

Table 8(a):Paired Sample Statistics for Folic Acid consumption

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

Fig 8: Graphical Representation of Comparison of Folic Acid Requirements in LSES & HSES with RDA

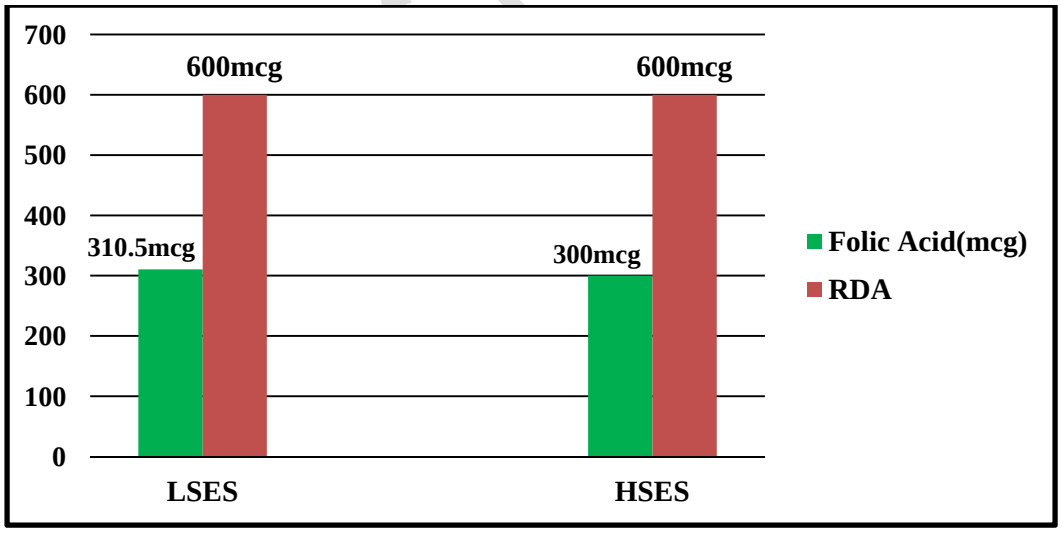

Fig 8 demonstrated that in LSES and HSES the Folic Acid consumption did not meet the RDA (Recommended Dietary Allowances) requirements but the consumption was at par with

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 HSES women as compared to LSES women because it was the consumption of the above food was more among 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 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 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 GDM, IUGR (Intra Uterine Growth Retardation), 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. .

References

1. Irene Cetin and Arianna Laoreti, 11th October 2015, The importance of maternal nutrition for health, Journal of Pediatric and Neonatal Individualized Medicine, doi: 10.7363/040220.
2. Liwei Chen, Frank B. Hu, Edwina Yeung, Walter Willett, and Cuilin Zhang, Dec 2009, Prospective Study of Pre-Gravid Sugar-Sweetened Beverage Consumption and the Risk of Gestational Diabetes Mellitus, Diabetes care, Volume-32, Issue-12, Pg No- 2236-2241, doi: 10.2337/dc09-0866.
3. Meaghan A Leddy, Michael L Power, and Jay Schulkin, 2008, The Impact of Maternal Obesity on Maternal and Fetal Health, Reviews of Obstetric & Gynecology, Volume 1, Issue-4, Pg No-170-178.
4. Wei Bao, Deirdre K. Tobias, Sjurdur F. Olsen and Cuilin Zhan, Dec 2014, Pre-pregnancy fried food consumption and the risk of gestational diabetes mellitus: a prospective cohort study, Diabetologia, Volume-57, Issue-12, doi: 10.1007/s00125-014-3382-x.
5. www.who.org.