International Journal of Food Science and Nutrition
ISSN: 2455-4898; Impact Factor: RJIF 5.14
Received: 16-12-2020; Accepted: 02-01-2021; Published: 01-02-2021
www.foodsciencejournal.com
Volume 6; Issue 1; 2021; Page No. 38-42

A study on maternal nutrition of pregnant women in Bihar

BR Abha Ayushree[1*], Sunita Kumari[2], Usha Singh[3]

[1] Department of Food and Nutrition, College of Community Science, Dr. Rajendra Prasad Central Agricultural University, Samastipur, Bihar, India

[2] Subject Matter Specialist Home Science, Department of Food and Nutrition, College of Community Science, Dr. Rajendra Prasad Central Agricultural University, Samastipur, Bihar, India

[3] Professor and Head, Department of Food and Nutrition, College of Community Science, Dr. Rajendra Prasad Central Agricultural University, Samastipur, Bihar, India

Abstract

Background: Studies have stated that inadequate nutrition during pregnancy is the main cause of maternal and infant mortality in India. Thus, balanced dietary intake by the pregnant mothers seemed to be an important determinant for reduction in infant and maternal morbidity and mortality rates in India.

Aim of The Study: To record the dietary intake of the respondents and compare the same with the available recommended dietary allowances (RDA).

Methods: A study has been carried out on pregnant women randomly selected in Pusa, Samastipur Bihar (India). 20 pregnant women of age group 18-30 years in first trimester as experiment and 20 non-pregnant women as controls participated in the study. Their nutrient intake, meal patterns and consumption of foods from various food groups was recorded through an interview schedule and 24 hour recall method.

Results: About 75% of the pregnant women consumed two meals per day and 25 per cent consumed three meals per day. A significantly ($P<0.05$) higher consumption of pulses and legumes, cereals and millets, GLV's, fruits, sugar and jaggery, fats and oils, meat, fish, poultry products, milk and milk products was observed in the experimental group in contrast to control group because of increased dietary intake during pregnancy. Consumption of different nutrients like energy, protein, fat, β-carotene, vitamin-C, folic acid, calcium and iron was significantly ($P<0.05$) higher among experimental group as compared to RDA.

Conclusion: The study concludes that mean daily intake of food and nutrients increases during pregnancy than normal condition as compared to RDA.

Keywords: pregnancy, RDA, maternal morbidity, infant mortality, nutrition

Introduction

Maternal nutrition and health is regarded as the most important regulator of human foetal development. A healthy mother can give birth to a healthy child. If women are not adequately nourished, they are more likely to give birth to low birth weight babies resulting in high infant mortality rate. Many studies in India and abroad have shown that undernourished women subsisting on unchanged dietary intake during pregnancy and lactation have an adverse effect on maternal and foetal health status. Throughout pregnancy, the growing foetus is entirely dependent on the mother's diet (Ghosh, 1989) [1]. There is a big role of nutrition in maternal and child health. Therefore, maternal nutrition plays vital role for sound health of the child during foetal period and infant's long term development as well. Thus, maternal nutrition and foetal development is interdependent (King, 2016) [2]. Maternal nutritional status might be a potentially modifiable risk factor which can reduce the prevalence of low birth weight if properly taken care (Rao *et al*. 2003) [3]. The maternal mortality rate is very high in India. Everyday around 830 women die from various causes related to pregnancy and child birth (WHO, 2018) [4]. Thus, maternal nutrition plays a major role in pregnancy. Poor maternal nutrition which results Low Birth Weight (LBW) infants is one of the most important cause of infant morbidity and mortality in the world. Nutritional sufficiency is one of the vital elements before, during and after pregnancy for support of foetal growth, development and maintenance of the mother's body. Due to inadequate intake of nutrients in diet like energy, protein, iron, calcium, etc. leads to various deficiency disorders like anaemia, megaloblastic anaemia, hypothyroidism, pregnancy induced hypertension, pregnancy induced diabetes mellitus etc. that affects the birth weight of the offspring. To overcome the disorders of pregnancy, diet rich in protein, iron and calcium should be provided for making effective use of combination of staple foods like cereals, pulses, green leafy vegetables, fruits, nuts and oils especially during second and third trimester of pregnancy. This may provide beneficial effect on gestational weight gain with decrease in prevalence of anaemia and decline in low birth weight percentage among newborns (Tontisirin *et al*. 1986) [5].

Materials and Methods

The methodology for systematic investigation on research title has been decided as under

- **Selection of Area:** Harpur panchayat of Pusa block in Samastipur district, Bihar was selected for the study.

- **Selection of subjects:** 20 pregnant women of age group 18-30 years of first trimester were selected for the study and 20 non pregnant women were selected for the control group.
- **Selection of research tools:** The tool selected for the study included interview schedule.
- **Data collection:** Their nutrient intake, meal patterns and consumption of foods from various food groups was recorded through 24 hour recall method for 4 consecutive days.
- **Analysis of data:** Required statistical methods i.e. t-test, z-test was applied to test the significance of the obtained data.

Results and Discussion

The results of the study are discussed and presented as under following headings:

Meal Pattern of the Pregnant Women

Eating is a way of life for women and can make a positive contribution to the nutrient quality of women's daily intake. As per food consumption, provide one - fourth to one - third of the daily energy intake for pregnant women.

In the present study, majority of women had two and three meal patterns per day whereas the intake of food increased with increasing income. Seventy-five percent of the pregnant women consumed two meals per day and rest 25 per cent consumed three meals per day. Lamyian *et al*. (2017) [6] studied on the relationship between fast food consumption and Gestational Diabetes Mellitus (GDM) among Tehranian women. The result showed that out of all women 71 women developed GDM due to fast food consumption.

Food Intake

Table 1: Mean Daily Food Consumption

Food groups	Control Group (n=20)	Experimental group (n=20)	t-value	RDA
Cereals and millets (g)	170.48±9.52	190.99±9.95	6.65*	270
Pulses and legumes (g)	48.15±5.5	55.5±7.13	3.64*	60
Milk and milk products (ml)	415.3±53.27	448.7±35.36	2.68*	500
Roots and tubers (g)	231.29±59.9	245.21±40.51	0.86^{NS}	200
Green leafy vegetables (g)	140.45±10.2	161.55±37.04	2.62*	150
Other vegetables (g)	150.55±3.8	159.05±11.7	3.07*	200
Fruits (g)	148.75±4.85	152.25±4.86	2.27*	200
Sugar and jaggery (g)	12.1±1.45	14.13±1.15	4.89*	20
Fats and oils (g)	30.71±1.64	32.2±1.77	3.93*	30
Meat, fish and poultry products (g)	51.85±5.13	60.5±7.1	4.43*	100

Values are Mean ± SD #ICMR (2016)
*Significant at 5% level of significance
NS-Non significant

Diet during pregnancy plays an important role for good health of mothers and foetus. Table 1 and Fig. 1 represent the mean daily food consumption. Deficient dietary intake during pregnancy is a remarkable contributor to global maternal malnutrition in less developed countries (Black *et al.* 2008) [7]. The results highlighted a significantly higher intake of cereals and millets among the respondents. An increased consumption of cereals and millets was seen in the control group with 170.48±9.52g as compared to experimental group significantly higher intake with 5% level of significance was observed with mean intake 190.99±9.95g. This was due to the fact that cereals were the staple diet in Bihar. The mean intake of pulses and legumes in control group i.e. among non-pregnant women was 48.15±5.5g but significantly increased to 55.5±7.13g in the experimental group. The mean daily intake of milk and milk products was revealed to be significantly increased at 5% level of significance with mean intake as 448.7±35.36 ml in experimental group as compared to control group i.e. 415.3±53.27 ml. Mean daily intake of the selected respondents showed slight increase in the consumption of roots and tubers. The mean intake of roots and tubers in control and experimental group was 231.29±59.93g and 245.21±40.51g respectively which is not significant. Data related to consumption of green leafy vegetables, experimental group had significantly higher intake i.e. 161.55±37.04g than control group intake i.e. 140.45±10.2g. This higher consumption of green leafy vegetables might be due to seasonal variation and hence greater availability of green leafy vegetables to improve the consumption of green leafy vegetables for enhancing their haemoglobin level during pregnancy than normal condition. Though, consumption of other vegetables was found to be increased significantly ($P<0.05$) in experimental group with mean intake as 159.05±11.7g than the control group mean intake (150.55±3.8g). The increase in consumption of other vegetables in experimental group may be due to positive effects of diet and intake of more number of meals during pregnancy than normal condition. The mean daily fruit intake of the control group was 148.75±4.85g as compared to the experimental group which increased significantly ($P<0.05$) during pregnancy with mean intake 152.25±4.86g. Lowensohn *et al*. (2016) [8] imparted that a diet rich in whole grains, fruits, vegetables and selected fish are recommendable for the best results during pregnancy. The mean intake of sugar and jaggery in the control group was 12.1±1.45g which increased significantly ($P<0.05$) to 14.13±1.15g in the experimental group i.e. during pregnancy for growth of the foetus. Anleu *et al*. (2019) [9] revealed that the accomplishment of a dietary intervention with nutritional counselling on sugar consumption with lower intake of energy and total sugars in pregnant mothers those who were overweight and obese was mostly within various food groups that are high in free sugars. The data on fats and oils intake revealed that most of the respondents consumed a greater amount of fat than recommended amount. In the experimental group the mean intake of fats and oils (32.2±1.77g) was significantly ($P<0.05$) higher than the control group with mean intake 30.71±1.64g. Calvani *et al*. (2006) [10] suggested that increased consumption of ω-6 polyunsaturated fatty acids (PUFA) and decreased

consumption of ω-3 PUFAs during pregnancy thereafter decreases allergic diseases (skin allergies) in the offspring. Further, the consumption of meat, fish and poultry products in the experimental group found to be increased significantly at 5% level of significance with mean intake as 60.5±7.1g as compared to the control group having mean intake 51.85±5.13g to meet higher demands of iron and folic acid during pregnancy. Bosaeus *et al.* (2015) [11] found that fish and meat consumption increases during early pregnancy that enables to build up fat free mass in the pregnant women. This finding correlated with RDA 2016 values according to ICMR study.

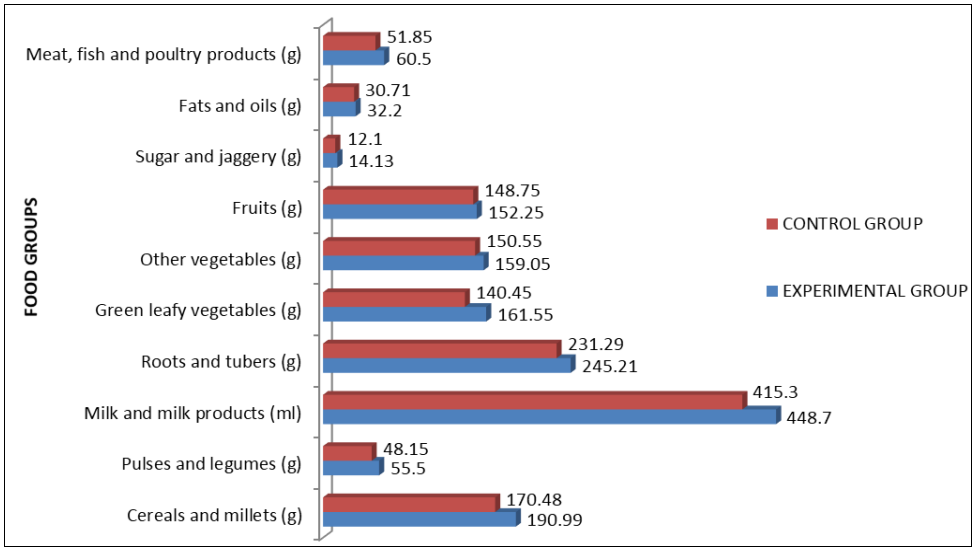

Fig 1: Graphical representation of mean daily food consumption

Nutrient Intake

The mean daily nutrient intake of respondents from both control and experimental group was displayed in Table 2 and Fig 2.

Table 2: Mean Daily Nutrient Intake

Nutrients	Control Group (n=20)	Experimental group (n=20)	T-value	RDA
Energy (kcal)	1799.3±100.82	1943.94±96.41	4.77*	2525
Protein (g)	49.64±4.52	53.54±3.5	3.14*	65
Total fat (g)	31.12±1.1	32.39±1.23	3.37*	30(visible)
Carbohydrates(g)	393.07±65.96	400.81±57.66	1.45^{NS}	441.875**
β-carotene (µg)	1778.15±208.02	1859.8±127.85	2.1*	2400
Vitamin C (mg)	30.65±7.18	33.12±1.91	1.63^{NS}	40
Folic acid (µg)	299.96±31.06	317.19±32.3	2.75*	400
Calcium (mg)	714.4±56.01	781.17±91.34	3.02*	1000
Iron (mg)	22.95±2.37	26.66±2.79	4.15*	38

**Based on 70% of energy from carbohydrates ICMR (2016)
Values are Mean ± SD
*Significant at 5% level of significance
NS-Non significant

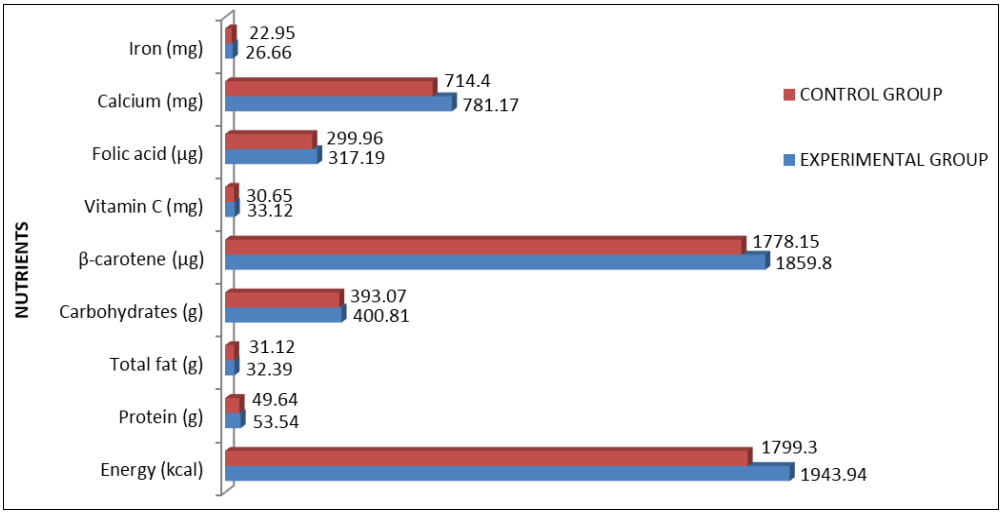

Fig 2: Graphical representation of mean daily nutrient intake

The mean daily intake of energy by the respondents in control group was 1799.3±100.82 kcal which increased significantly (P<0.05) to 1943.94±96.41 kcal in the experimental group. The higher intake of cereals and fats and oil by the pregnant women might have attributed to high intake of energy. The mean daily intake of protein among respondents in control group was 48.25±2.08 while protein intake was stated to be significantly higher among experimental respondents with mean intake 53.54±3.5g. The higher intake of protein may be due to the fact of increased ingestion of milk and milk products and pulses among respondents in experimental group. The mean daily intake of total fat (visible and invisible) in the control group was 31.12±1.1g which increased significantly (P<0.05) to 32.39±1.23g in the experimental group. This increase in experimental group was due to high consumption of desi cow ghee, oily and fried food by the pregnant women. The mean daily consumption of carbohydrates among the respondents in control group was 393.07±65.96g which increased significantly (P<0.05) to 400.81±57.66g. This was due to high intake of cereal based diets by the pregnant women in experimental group. There was a significant rise in the mean intake of β-carotene (1859.8±127.85µg) in the experimental group as compared to control group (1571.35±79.4µg). Vahamiko *et al* (2013) [12] suggested that β-carotene intake increases during pregnancy as compared with controls. The mean daily intake of ascorbic acid in control group was 30.65±7.18 mg which increased significantly (P<0.05) to 33.12±1.91 mg in the experimental group. The data regarding consumption of folic acid stated that mean daily intake of folic acid was 299.96±31.06 µg in the control group while in the experimental group the mean intake of folic acid increased significantly (P<0.05) to 317.19±32.3 µg because more consumption of green leafy vegetables, iron and folic acid supplementation among pregnant women. The results revealed that mean daily intake of calcium by the respondents in control group was 714.4±56.01 mg which increased significantly (P<0.05) to 781.17±91.34 mg in the experimental group. The mean daily intake of iron by the respondents in control group was 22.95±2.37 mg which increased significantly (P<0.05) to 26.66±2.79 mg indicating a significant impact of higher food intake on consumption of iron in the experimental group and increased consumption of meat and poultry products which helped in absorption of iron. Gautam *et al*. (2008) [13] studied that the intake of calories, protein, folic acid and iron was found to be less than the RDAs in 100 per cent i.e. 91.2 per cent, 98.2 per cent, 99.1 per cent and 65.8 per cent of women respectively. These findings correlate with RDA 2016 values according to ICMR study.

Conclusion

The study concludes that during pregnancy provision of food products is of importance in modifying food and nutrient intake, for potential health benefits. Thus, it might be concluded that mean daily intake of all the nutrients other than fat which was insufficient among both pregnant and non-pregnant women as compared to RDA. Anyhow, the results stated that mean daily intake of nutrients increases during pregnancy. On the whole, positive impact of higher nutritional requirements during pregnancy increases intake of food especially in pregnant women than non-pregnant women that showed a significantly higher intake of nutrients for delivering a healthy baby. The mean dietary intake of foods from various food groups was also higher among pregnant women but significantly higher in cereals & millets, pulses and legumes, GLV's, other vegetables, fruits, sugar & jaggery, fats & oils subsequently milk and milk products in comparison to non-pregnant women due to positive dietary impact in intake during pregnancy than normal condition. However, the mean values of food types depicted insufficient consumption of all the food groups when compared to the RDA.

Acknowledgements

Author expressed special thanks to Dr. Anjali Tarai Associate Professor, PRM Medical College, Baripada, Odisha for providing support during the study.

References

1. Ghosh S. Maternal Health and Nutrition. Nutrition and Child Care: A Practical Guide, Second edition, 1989, 25-28.
2. King JC. A summary of pathways or mechanisms linking preconception maternal nutrition with birth outcomes. Journal of Nutrition. 2016; 14:1437-44. https://doi.org/10.3945/jn.115.223479
3. Rao S, Kanade A, Margetts BM, Yajnik CS, Lubree, H, Rege S *et al*. Maternal activity in relation to birth size in rural India. The Pune Maternal Nutrition Study. European Journal of Clinical Nutrition. 2003; 57(4):531-542.
4. WHO Fact Sheets Maternal Mortality, 2018. https://www.who.int/news-room/fact-sheets/detail/ maternal- mortality.
5. Tontisirin K, Booranasubkajorn U, Hongsumarn A, Thewtong D. Formulation and evaluation of supplementary foods for Thai pregnant women. The American Journal of Clinical Nutrition. 1986; 43(6):931-939. https://doi.org/10.1093/ajcn/43.6.931
6. Lamyian M, Hosseinpour-Niazi S, Mirmiran P, Moghaddam Banaem L, Goshtasebi A, Azizi F *et al*. Pre-pregnancy fast food consumption is associated with gestational diabetes mellitus among Tehranian women. *Nutrients*. 2017; 9(3):216. https://doi.org/10.3390/ nu9030216
7. Black RE, Allen LH, Bhutta ZA. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet*. 2008; 371:243-60. https://doi.org/10.1016/S0140-6736(07)61690-0
8. Lowensohn RI, Stadler DD, Naze C. Current concepts of maternal nutrition. Obstetrical & Gynaecological Survey. 2016; 71(7):413. https://dx.doi.org/10.1097%2FOGX.0000000000000329
9. Anleu E, Reyes M, Araya B, Flores M, Uauy R, Garmendia ML *et al*. Effectiveness of an intervention of dietary counselling for overweight and obese pregnant women in the consumption of sugars and energy. *Nutrients*. 2019; 11(2):385. https://doi.org/10.3390/ nu11020385
10. Calvani M, Alessandri C, Sopo SM, Panetta V, Pingitore G, Tripodi S *et al*. Lazio Association of Paediatric Allergology (APAL) Study Group. Consumption of fish, butter and margarine during pregnancy and development of allergic sensitizations in the offspring: role of maternal atopy. Paediatric Allergy and Immunology. 2006; 17(2):94-102. https://doi.org/ 10.1111/j.1399-3038.2005.00367.x

11. Bosaeus M, Hussain A, Karlsson T, Andersson L, Hulthén L, Svelander C *et al*. A randomized longitudinal dietary intervention study during pregnancy: effects on fish intake, phospholipids, and body composition. Nutrition Journal. 2015; 14(1):1.
12. Vähämiko S, Isolauri E, Poussa T, Laitinen K. The impact of dietary counselling during pregnancy on vitamin intake and status of women and their children. International Journal of Food Sciences and Nutrition. 2013; 64(5):551-560. https://doi.org/10.3109/09637486.2013.766153
13. Gautam VP, Taneja DK, Sharma N, Gupta VK, Ingle G.K. Dietary aspects of pregnant women in rural areas of Northern India. Maternal and Child Nutrition. 2008; 4:86-94.https://doi.org/10.1111/j.1740-8709.2007.00131.x