The MedS Alliance
Journal of Medicine and Medical Sciences

Original Investigation

Assessment of Dietary Patterns of Pregnant Women in Southern Nepal

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ARTICLE INFO

Article history:
Received: 17 March 2021
Revised: 27 May 2021
Accepted: 11 June 2021

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Citation:
Prakash S, Pandeya DR, Yadav BK, Yadav K. Assessment of dietary patterns of pregnant women in southern Nepal. MedS. J. Med.Sci.2021;1(1):50-58

ABSTRACT

INTRODUCTION: Quality and balanced diet becomes very crucial to the health of woman during and after pregnancy. Therefore, the study was focused on the nutritional behaviour and dietary pattern of women during pregnancy.

MATERIALS AND METHODS: Cluster random sampling was adopted. Total 336 pregnant women were selected, out of which 224 were pregnant women (cases) and 112 were non-pregnant healthy women (controls). Maternal demographics information was collected by a structured questionnaire. Data was entered into MS Excel and analyzed using SPSS version 20. Chi-square test was used. The p-value ($p< 0.05$) was considered statistically significant.

RESULTS: Among pregnant women, 27.23%, 32.58%, 30.95% and 9.82% women consumed meat daily, twice per week, once per week and none respectively while among non-pregnant women the consumption of meat was 25.89%, 50.89%, 17.85% and 5.35% respectively. The association of consuming meat twice per week and fish among pregnant and non-pregnant women was noted statistically significant ($p=0.005$). More number of study participants drank tea and milk daily. The co-relation between pregnant and non-pregnant women regarding drinking (tea and milk) daily was statistically insignificant ($p=0.881$ and $p=0.122$) respectively. However, the relation between pregnant and non-pregnant women for intake of juice was statistically significant ($p=0.007$).

CONCLUSIONS: Thus, the findings of this research suggest the need for a balanced nutritional diet among Nepalese pregnant women for proper foetal growth, good health of pregnant women and to avoid complications during pregnancy. Nutrition education programs in the community should be launched.

KEY WORDS: Diet, juice, meat, nutrition, pregnancy

INTRODUCTION

Women's health during pregnancy is an important determinant of their children's health, both in utero and during childhood [1]. Fundamental aspects of healthy dietary behaviours during pregnancy include consuming foods that contain optimal amounts of energy as macro-nutrients and micro-nutrients, achieving appropriate weight gain, adhering to general and pregnancy-specific food safety recommendations and avoiding ingestion of harmful substances [2].

Inadequate maternal nutritional intake during pregnancy may lead to negative short and long-term health consequences [3, 4] related to reduced fetal growth and augmented risk of respiratory disease in early childhood whereas cardiovascular diseases, type 2 diabetes mellitus, obesity and osteoporosis in later life [5-8]. Anorexia nervosa, bulimia nervosa [9], preeclampsia, low birth weight, neonatal hypocalcemia, poor postnatal growth, bone fragility, and an increased incidence of autoimmune diseases during and after pregnancy are also associated with the poor nutritional state [10].

Balanced energy and protein dietary intake are essential for pregnant women to prevent the risk of stillbirth and small-for-gestational-age neonates [11]. Anemia caused due to a deficiency of iron can lead to an increased rate of maternal morbidity, mortality and poor birth outcomes [12]. Earlier evidence of research highlight inadequate consumption of nutritional diet during pregnancy [13,14] and report the association of low birth weight of children with insufficient nutrient intake such as riboflavin, folic acid and vitamin C during the third trimester [14]. The prevalence of anemia is higher for pregnant women and lactating mothers (46%) compared to non-pregnant and non-lactating women (39%) [12].

Nepal Demographic and Health Survey (NDHS) 2016, also reports 12% of children to have low birth weight (below 2.5 kg) among children with reported birth weight [12]. In scientific literature's, it is widely recognized that inadequate diet during pregnancy can contribute to the development of certain diseases among offspring [15-18] as well as the occurrence of metabolic alterations in pregnant women [19, 20]. Socio-economic status and level of education is another factor that considerably determines human health-related behaviour [21]. Poor resource settings on dietary pattern shows, abundant cereal consumption and plant-based nutrient intake but occasional consumption of a balanced diet during pregnancy [22].

Although several international studies have assessed diet before and during pregnancy [23-25], there are very limited numbers of research conducted in Nepal on nutrient intake among pregnant women [26,27]. Inadequate supplementation of nutrients during pregnancy has been one of the general public health issues around the globe, in South Asia as well as Nepal [22, 28]. There is a relative paucity of data on the maternal dietary patterns which is important for devising appropriate means to promote healthy eating behaviours among Nepalese pregnant women. Therefore, the study was focused on the nutritional behaviour and dietary pattern during of women during pregnancy in the southern Terai region of Nepal.

MATERIALS AND METHODS

Study design and setting

This case-control study was carried out in the Department of Biochemistry at Clinical Pathology Laboratory, in association with Department of Obstetrics and Gynaecology, Janaki Medical College (JMC) from January 2015 to June 2017. Cluster random sampling was adopted.

Participants and study procedures

Total sample size was calculated as 336 women, out of which 224 were pregnant women (cases) and 112 were non-pregnant healthy women (controls). Higher numbers of cases were included without compromising the power of study based on available literature and studies [29-31]. 126 pregnant women were from Janaki Medical College, Janakpurdham, Nepal and 98 pregnant women were from antenatal clinics at Janakpur sub-metropolitan city. A total of 112 healthy non-pregnant women were selected from Marie Stopes Center, Janakpurdham who seeked temporary family planning services and served as controls. Pregnancy status was confirmed by a validated pregnancy test report.

Healthy non-pregnant and pregnant women of reproductive age who provided written consent were included. Pregnant women with gestational diabetes mellitus, hypertension, obesity, other chronic diseases, age above 45, any physical and mental disability, and women who have miscarriage or stillbirth during the recruitment process or not willing to give consent for participation in this study were excluded.

A structured questionnaire was prepared for the interview. The aims and objectives of study were explained to all study subjects. During the survey, the interviewer explained any of the questions that were not clear to the participants. The questionnaire was based on Family Planning Association of Nepal questionnaire, women health specialists and other international studies with some modifications. Maternal demographic information was collected by a questionnaire which included women's current age, pre-

pregnancy weight, self-reported gestational age, ethnicity, level of education, marital status and household income. Ethical approval was granted by Institutional Review Board (IRB) of Janaki Medical College, Janakpur, Nepal.

Statistical consideration

Answers from completed questionnaires were entered into Microsoft Excel spreadsheet and analyzed using SPSS version 20. Simple distribution of the study variables and cross-tabulation were applied. Chi-square test was used to identify the significance of relations, associations and interactions among various variables. Range as minimum and maximum values were calculated. p-value less than 5% ($p<0.05$) was considered statistically significant.

RESULTS

Socio-demographic parameters of the study participants

Out of total 336 women, 224 were pregnant and 112 were non-pregnant. Most of the participants (80.05%) were in the general category followed by Janajati and Dalit. The association of distribution of Caste/ethnicity among pregnant women and non-pregnant healthy women was statistically insignificant ($p = 0.081$). More number of participants (92.4%) was Hindu, 5.8% were Muslim and only 1.8% was from other religions. Religion was found to be statistically insignificant ($p = 0.986$). Similarly, relation of education among pregnant and non-pregnant women was found to be statistically significant ($p= 0.009$). The highest number of pregnant women were housewives (57.14%) and association among pregnant and non-pregnant healthy women for occupation was found statistically insignificant ($p=0.730$). Similarly, association of family income between pregnant and non-pregnant healthy women was found to be statistically insignificant ($p=0.340$) (Table1).

Food intake of the participants

Table 1| Socio-demographic parameters of the study participants (n=336)

Characteristics	Pregnant women n (%)	Non-pregnant healthy women n (%)	Total n (%)	Test statistic
Caste/ Ethnicity				
Dalit	9 (4)	4 (3.6)	13 (3.86)	$\chi2= 5.0$
Janajati	43 (19.19)	11 (9.8)	54 (16.07)	$p= 0.081$
General	172 (76.8)	97 (86.6)	269 (80.05)	
Religions				
Hindu	207 (92.4)	104 (92.9)	311(92.55)	$\chi2= 0.02$
Muslim	13 (5.8)	6 (5.4)	19 (5.65)	$p= 0.986$
Others	4 (1.8)	2 (1.8)	6 (1.78)	
Educational status				
Illiterate	23 (10.26)	13 (11.60)	36 (10.71)	
Primary School	34 (15.17)	21 (18.75)	55 (16.36)	
Preparatory School	98 (43.75)	27 (24.10)	125 (37.20)	$\chi2=13.28$
Secondary School	58 (25.89)	41(36.60)	99 (29.46)	$p= 0.009$
University	11 (4.91)	10 (8.92)	21 (6.25)	
Occupation				
House wife	128 (57.14)	61 (54.46)	189 (56.25)	
Business	4 (1.78)	3 (2.67)	7 (2.08)	$\chi2= 2.03$
Service	5 (2.23)	5 (4.46)	10 (2.97)	$p= 0.730$
Labour	18 (8.03)	11 (9.82)	29 (8.36)	
Agriculture	69 (30.80)	32 (28.57)	101 (30.05)	
Family income (NRs)				
Less than 5000	80 (35.71)	33 (29.46)	113 (33.63)	
5000-10,000	88 (39.28)	51(45.53)	139 (41.36)	$\chi2= 2.15$
Greater than 10,000	56 (25)	28 (25)	84 (25)	$p= 0.340$

Table 2 shows food intake viz. meat, egg, fish, fruit, and vegetable intake among pregnant and non-pregnant healthy women. The details about the distribution of age, obstetrics history, BMI, Blood Pressure of study participants has been previously reported in our study [32, 33]. Among pregnant women, 27.23%, 32.58%, 30.35% & 9.82% women consumed meat daily, twice per week, once per week & none respectively while this figure among non-pregnant women was 25.89%, 50.89%, 17.85% & 5.35% respectively. The data shows both pregnant and non-pregnant women consumed meat twice per week which was found to be statistically significant (p=0.005). The least number of pregnant women consumed fish daily with 6.25% while this figure among non-pregnant women was 14.28%. Pregnant women (29.46%) and 8.92% of non-pregnant women did not take fish. The association of consuming fish among pregnant and non-pregnant women was noted statistically significant (p=0.000). Of total pregnant women, 30.80%, 25%, 34.37%, and 9.82% women consumed egg daily, twice per week, once per week and none respectively whereas, among non-pregnant women, 38.39%, 25.89%, 28.57%, and 7.14% women consumed egg daily, twice per week, once per week and none respectively (Table 2).

Table 2| Food intake of the participants

Food group	Frequency (%)				Total	Test Statistic
	Daily	Twice/week	One/week	None		
Meat						
Pregnant	61(27.23)	73 (32.58)	68 (30.35)	22 (9.82)	224	$\chi2$=12.75
Non-pregnant	29 (25.89)	57 (50.89)	20 (17.85)	6 (5.35)	112	p=0.005
Total	**90**	**130**	**88**	**28**	**336**	
Fish						
Pregnant	14 (6.25)	63 (28.12)	81 (36.16)	66 (29.46)	224	$\chi2$= 21.08
Non-pregnant	16 (14.28)	39 (34.82)	47 (41.96)	10 (8.92)	112	p<0.0001
Total	**30**	**102**	**128**	**76**	**336**	
Egg						
Pregnant	69 (30.80)	56 (25)	77 (34.37)	22 (9.82)	224	$\chi2$= 2.68
Non-pregnant	43(38.39)	29 (25.89)	32 (28.57)	8 (7.14)	112	p=0.442
Total	**112**	**85**	**109**	**30**	**336**	
Fruits and vegetables						
Pregnant	96 (42.85)	65 (29.01)	59 (26.33)	4 (1.78)	224	Corrected
Non-pregnant	52 (46.42)	40 (35.71)	11 (9.82)	9 (8.03)	112	$\chi2$= 18.11
Total	**148**	**105**	**76**	**13**	**336**	p=0.002

Liquid intake of participants

Among pregnant women, 40.62% women drank tea daily, 29.91% women drank tea twice per week, 9.82% women drank tea once per week and 19.64% women did not drink tea. This figure in non-pregnant healthy women was 39.28%, 30.25%, and 17.85%. Thee association between pregnant and non-pregnant women regarding drinking of tea was found to be statistically insignificant (p=0.881). Similarly, the association between drinking coffee between pregnant and non-pregnant women was observed as statistically significant (p=001).

Likewise, 39.73%, 29.91%, 25% and 5.34% of pregnant women drank milk daily, twice per week, once per week and none respectively while this figure in non-pregnant women was 42.85%, 33.03%, 23.21%, and 1%. The highest number of study participants drank milk daily and the relation of drinking milk between pregnant and non-pregnant women was found to be statistically insignificant (p=0.122). Similarly, the association between pregnant and non-pregnant women for juice intake was statistically significant (p=0.007) (Table 3).

Table 3| Liquid intake of participants

Liquid Drink	Frequency (%)				Total	Test Statistic
	Daily	Twice/week	One/week	None		
Tea						
Pregnant	91 (40.62)	67 (29.91)	22 (9.82)	44 (19.64)	224	$\chi2$=0.663
Non-pregnant	44 (39.28)	34 (30.35)	14 (12.5)	20 (17.85)	112	p=0.881
Total	**135**	**101**	**36**	**64**	**336**	
Coffee						
Pregnant	54 (24.10)	49 (21.87)	34 (15.17)	87 (38.83)	224	$\chi2$= 9.89
Non-pregnant	43 (38.39)	27 (24.10)	10 (8.92)	32 (28.57)	112	p=0.01
Total	**97**	**76**	**44**	**119**	**336**	
Milk						
Pregnant	89 (39.73)	67 (29.91)	56 (25)	12 (5.34)	224	Corrected
Non-pregnant	48 (42.85)	37 (33.03)	26 (23.21)	1 (1)	112	$\chi2$= 3.85
Total	**137**	**104**	**82**	**13**	**336**	p=0.122
Juice						
Pregnant	97 (43.30)	83 (37.05)	42 (18.75)	2 (1)	224	Corrected
Non-pregnant	64 (57.14)	34 (30.35)	10 (8.92)	4 (3.57)	112	$\chi2$= 11.10
Total	**161**	**117**	**52**	**6**	**336**	p=0.007

DISCUSSION

Pregnancy demands adequate requirement of nutrients for positive outcomes of both mother and fetus [34].The present study revealed that most of the participants (80.05%) belonged to General category followed by Janajati and Dalit. Caste/ethnicity among pregnant and non-pregnant healthy women was as statistically insignificant (p=0.081). This might be due to the broad framework of the general caste hierarchy that is replicated with countless local variations, dominance and along with their elaborations in this region.

Most of the participants in pregnant women were Hindus (92.4%), 5.8% were Muslims, 1.8% were from other religions. Similarly, in non-pregnant healthy women, 92.9%, 5.65%, and 1.78% were Hindu, Muslim, and other religions respectively which was found to be statistically insignificant (p=0.986) with pregnant women. Timilsina et al. also reported Hindu (85.8%) in their study, which is almost parallel to our results [35]. This may be because, majority of the Nepalese population still prefer a Hindu state at the national level. Hence, the dominance by religion in this region is more significant.

This study reflects that most of the pregnant women had preparatory school education (43.75%) and 25.89% pursued secondary education. This may be due to the easy availability of primary and secondary education.Very few of the participants had a university level education where as 10.26% were illiterate. Similar types of findings was also found in non-pregnant healthy women. The results were found to be statistically significant (p=0.009). A similar type of study was conducted among 323 pregnant women who visited Gynaecology and Obstetrics Out-Patient Department (OPD) at Tribhuvan University Teaching Hospital (TUTH) for regular Antenatal Care (ANC) check-ups, which highlighted the education level of pregnant women as 1.9% uneducated, 0.9% vocational education, 3.1% primary level, 12.7% lower secondary, 25.1% secondary, 29.7% higher secondary, 22% bachelor and 4.6% master level of education [35], which is nearly in agreement with our results. This may be because of the females residing in rural areas, less participation in higher studies and also unsupportive husbands or family members. Another possibility may be the gender disparity, family responsibility, joint families, under-developed education systems, lack of information, work, power, decision-making, environment and poverty.

Most of the pregnant participants were housewives (57.14%) followed by involvement in agriculture (30.80%), 8.03% were labour, 2.23% were service holders and very few were involved

in business (1.73%). The prospect may be related to the poor education system and more involvement in farming and forestry. Another major possibility may be due to the rural phenomenon with approximately 75% of the population living in villages, with agriculture as their main source of subsistence in this area. Lower caste pregnant women were found to be desperately poor and were involved in agriculture to satisfy their stomach twice a day which were continued in the traditional way of agriculture instead of adopting modern and scientific ways due to lack of necessary infrastructure, equipment and training to the farmers. Likewise, 54.46% non-pregnant healthy women were housewives followed by involvement in agriculture (28.57%), 9.82% were labour, 4.46% were service holders and only 2.67% were business holders. The association between pregnant and non-pregnant healthy women relation to occupation was found statistically different (p=0.730). A similar study conducted by Azab et al. observed 32.5% housewives, 35.8% teachers, 15% worked in hospitals, 8.3% office workers, 5.8% university staff members, and 2.5% Engineers [36]. In Iran, Khojasteh et al. found that 53.3% were housewives, 38.7% were teachers, 18.9% worked in hospitals and 42.5% were office workers [37]. The highest numbers of pregnant women were unemployed compared to non-pregnant womens as reported in Gaza [38]. The above results are not concurrent with our study, which may be due to the lack of knowledge about women empowerment, low income, unfavorable health behaviors and the economic situation of family.

The present study found that, highest number (39.28%) of pregnant women had income between Nrs. 5,000 to 10,000 and least number (25%) had greater than Nrs. 10,000 incomes. Similar type of finding was also obtained in non-pregnant healthy women. Study conducted by Al-Tawil RS revealed that pregnant women had a lower income than non-pregnant women [38]. These findings are in agreement with the results obtained by Rawe et al., [39] and Russel and Banks [40]. The main reason behind this could be the long political instability in Nepal, which still remains as one of the poorest and slowest-growing economies in Asia. Other reasons may be high population growth rate, growing unemployment and underemployment. Another prospect might be the structure of national income distribution which is rigidly centralized in the urban cities along with inequality in income distribution.

Balanced nutritious diet is an important aspect of healthy pregnancy. The results of this study showed that both the pregnant and non-pregnant women consumed meat twice per week which was found to be statistically significant (p=0.005). The association of consuming fish among pregnant and non-pregnant women was noted statistically significant (p=0.000). Most of the pregnant women consumed eggs once per week while this figure among non-pregnant women was observed on a daily basis. The association of consuming eggs between pregnant and non-pregnant women was found to be statistically insignificant (p=0.442). Likewise, the relation of consuming fruits and vegetables among pregnant and non-pregnant women was noted as statistically significant (p=0.002). Study conducted by Sato et al. also reported less frequent consumption of meat and egg and higher consumption of fruits among pregnant than non-pregnant women [41]. However, Pick et al. [42], Verbeke and De Bourdeaudhuij [43] found that pregnant women reported higher consumption of fruits, which resulted in a better score for fiber intake. Similarly, a study conducted by Singh and Singh in the Dhanusha district of Nepal, demonstrated a significantly high amount of food consumption in the intervention group as compared to the control group at post-intervention for all food groups except cereals/grains and other vegetables [27]. Another study conducted in rural Nepal revealed that rice, potatoes, legumes and vegetable oil were consumed regularly among reproductive-aged women while food of animal origin and fruits were consumed infrequently [43].

But, a study conducted in an Islamic university of Gaza, reported that pregnant women ate less meat, fish and egg than non-pregnant women, however, fruits and vegetables were eaten more frequently by pregnant women [38]. Poor consumption of such food stuff may be attributed

to cravings or dislike for certain foods particularly, in the first trimester and/or lack of knowledge among pregnant women regarding food consumption during pregnancy.

The highest number of study participants drank tea daily and the association between pregnant and non-pregnant women was found to be statistically insignificant (p=0.881). Most of the pregnant women (38.83%) did not drink coffee. The association between drinking coffee between pregnant and non-pregnant women was observed as statistically significant (p=001). The highest number of study participants drink milk daily and the relation of drinking milk between pregnant and non-pregnant women was found to be statistically insignificant (p=0.122). The association between pregnant and non-pregnant women for intake of juice was statistically significant (p=0.007).

Al-Tawil RS [38] observed that pregnant women drank less tea, coffee, milk but more juice than non-pregnant women. A similar result was pointed out by Sato et al. [41], who found that pregnant women drink coffee less frequently than non-pregnant women. Bhandari et al. demonstrated that the majority of women consumed cereals at least once a day, vegetables thrice a week, meat or meat products, and fruits once a week while milk and milk products were consumed once a day in all three ecological regions of Nepal [26]. An interventional study shows consumption of fruit juice increased substantially among pregnant women in a deprived population in the voucher group as compared to the advice group [44].

CONCLUSIONS

The study concludes with the dominance of participants from the Hindu religion in the general category followed by Janajati and Dalit. The majority of the participants were housewives dived by involvement in agriculture. The intake of meat on daily basis followed by fruits and vegetables was found to be high among pregnant women. In liquid diet, juice was mostly taken on a daily basis followed by tea among pregnant females. Although nutrient intake was observed but intake of balanced nutritious food was not found.

Thus, the findings of this research suggest the need for a balanced nutritional diet among Nepalese pregnant women for proper foetal growth, good health of pregnant women and to avoid complications during pregnancy. Nutrition education programs in the community should be launched as a health education programme and motivation towards intake of nutritional supplement diet should be promoted during antenatal check-ups. The need for diet therapy and a planned diet for pregnant women under the guidance of nutrition and dietetics become very relevant. Similar follow-up researches with a large sample size are recommended.

ADDITIONAL INFORMATION AND DECLARATIONS

Acknowledgements: We are thankful towards all the logistic supports provided by Janaki Medical College, Janakpur. We are also grateful to all academicians of Janaki Medical College for their intellectual positive critics and insightful cooperation during this research.

Funding: Self

Competing Interests: The authors declare no competing interests.

Author Contributions: Concept and design: SP,DRP; Statistical analysis: SP,DRP; Writing of manuscript: SP,DRP,KY,BKY; Final revision and editing of manuscript: SP,DRP,KY,BKY. All authors contributed to all-analysis, interpretation of results, literature review, and revision of the manuscript, and all have read and agreed with the contents of the final manuscript.

Data Availability: Data will be available upon request to corresponding authors after valid reason.

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