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Assessment of Nutrition Knowledge in Pregnant Women of Lahore: An Interview Based Study at Major Hospitals of Lahore During Prenatal Visits

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ABSTRACT

Background: The intentions of the following study were to assess women knowledge regarding dietary practices during pregnancy. The study expresses the nutrition related knowledge of pregnant females and its correlation with associated factors of these women. The study also shows the sources of dietary guidance for these women during pregnancy. **Method:** The study members visited different hospitals of Lahore, interviewed pregnant women and filled questionnaire regarding their knowledge of dietary practices during pregnancy. The statistical tests applied were frequency, percentage, mean, standard deviation, Regression, Kolmogorov-Smirnov test and Spearman's correlation. **Results:** 364 questionnaires were finished and analysed using software. Pregnancy related nutrition knowledge was positively correlated with level of education ($rs= 0.46$, $p<0.05$) and monthly income ($rs=0.27$, $p<0.05$). Only 4.3% of women attained pregnancy scores related to nutrition knowledge above 50%. They mostly get information from their mothers and doctors. Majority of the women recommended increasing intake of supplies from all food groups and fluid. The result indicated that nutritional behaviour of women was characterized by many ill practices. **Conclusion:** Women interviewed for this research had restricted nutrition knowledge and proper nutrition guidelines were not provided to pregnant women at health care facilities. Women followed insufficient food routines in pregnancies that were mostly directed by mothers of women. The diet of a female during pregnancy has a direct effect on fitness outcomes of mother and child. Many women lacked this information and thus ended with micro-nutrient deficiencies. So there is an alarming need to train women to enhance their knowledge for appropriate dietary patterns to avoid severe outcomes in the form of compromised maternal-child health.

INTRODUCTION

Do you believe you're eating right? Healthy and balanced diet, with adequate nutrients is important for every individual. However, it is most important when a newborn is being formed. The deficiency or excess of macronutrients and micronutrients can pose a serious threat to the life of child as well as mother. That being the case, having a basic understanding of nutritional requirements before, during, and after pregnancy is crucial. The chances of miscarriage, neural defects, metabolic disorders, delivery complications, preterm birth, still birth, low birth weight and other non-communicable diseases are common symptoms developed on the account of nutritional imbalances during the window of opportunity; the first 1000 days of life (1,2). Thus, providing sufficient nutrients and

nutrition education will help to mitigate these negative effects.

People in our society, especially in urban areas, often believe that they have sufficient knowledge of nutrition and their needs at various stages of life. However, various surveys and interviews revealed that, in comparison to developed societies in other nations, there is a lack of awareness. This is also evident by the report of National Nutritional Survey in Pakistan 2018. 41.7% women of child bearing age are anaemic and 79.7% are Vitamin D deficient that is an alarming situation and directly costs the health of mother. Malnutrition parameters in children under five are also alarming as 40.2% are stunted, 28.9% underweight, 17.7% wasted and 9.5% are overweight children (3) . A survey on school going children found 44% of the children to be malnourished (4) .The prevalence of these problems is increasing day by day, both of these reports point to food insecurity as the primary cause.. As 37% households of Pakistan are food insecure (5).

Energy requirements may not increase during the first trimester of pregnancy, but they may in the second and third trimesters. But the need for vitamins and minerals like iron, folic acid and iodine increase from the first day (6) . The deficiency may cause birth defects or still birth. Bacterial exposure like listeria may also cause harm. As a result, nutrition and food safety play a notable role in the health of pregnant women and their children.

Iron deficiency in mothers can be treated with diet, but folic acid deficiency requires supplementation. Iron is needed as 27mg per day (7) while daily reference intake of folic acid is 400-600mcg (8) . So increasing the consumption of meat, eggs, nuts, seeds, and green leafy vegetables may help improve nutritional status. It's also essential to keep an eye on mother's calcium intake. For healthy bones, 1000 to 1300 g of calcium from dairy products and seeds should be consumed daily.

Many nutritional programs are working actively in Pakistan like School Health Programme for nutrition intervention among children and nutrition awareness among their parents, Micronutrient Initiative works to eliminate deficiencies of micronutrients like iodine, folic acid, zinc, vitamin A, and works for salt iodization and flour fortification, Tawana Pakistan Project works for nutrition of primary school girls , National Programme for Family Planning and Primary Health Care aims child and mother health and works for community , Nutrition Wing of Ministry of Health do nutritional screening and evaluation for different programmes and works for food safety and its quality (4). But there exist many limitations due to which these programmes are not giving considerable result. They may be implemented, but due to expenses and temporariness, they do not provide permanent solutions. The barriers of illiteracy, low socio-economic status and poverty must be broken to get the interventions work at grass root level. Meanwhile, at this stage, immediate identification and direct supply of food and nutrients are required for improved maternal and child health, as they are the future builders of society. As a meta-analysis showed that nutrition education and counselling can help improve the nutritional behaviours and polish the health outcomes for women of child bearing age at a rewarding extent (9).

MATERIAL AND METHODS

Questionnaire Design

A study was planned for gestating women to understand their awareness regarding food and nutrition practices. The research comprised of face to face interview, based on the questionnaire consisting of about 72 open and closed ended questions (10). The questionnaire was tailored according to the Pakistani community, considering their traditional foods and habits, as well as their language. The fact sheet on pregnancy and diet served as the basis for the questionnaire that was developed by the NHMRC and Food Standards Australia.

Questions about food knowledge were asked with the answers of 'more', 'same', 'less'. An option of 'not sure' was also added to minimize the error and chance of guessing. The questions focused on fruit and vegetable servings, nutrient supplementation, high-risk foods, gestational weight gain target, knowledge source, and energy needs. A few questions were left open in order to obtain accurate results. At the end, a segment on general nutrition awareness was added to provide access to general nutrition information.

The effect of pregnancy on dietary consumption was assessed by asking the following questions: as if pregnant women eat the same amount of all five food groups, fiber, water, salty, sugary, and fatty foods; or if pregnant women eat the more of all five food groups; or they eat less amount of these food groups. For women's comprehension, the term grain food was used instead of starch. The aim of including multiple food groups was to monitor improvements in the core food group, as a high consumption of vegetables and fruits give evidence of high intake of fiber. However, variety of sugary, salty, and fatty foods were introduced to quantify the intake of discretionary foods. The questionnaire's validity was ensured by having it filled out by general physicians, nutritionists and medical students.

Women were given twelve multiple choices and the option of others when asked how they obtained the knowledge. They were given a choice of three widely used information sources. Nutritionist/dietitian, gynecologist, general practitioner, social media, childbirth education center, husband, newspapers, magazines, blogs, colleagues, parents, midwives, and others were some of the possibilities.

The demographic information was added for evaluation which included age, gestation period, monthly income, number of children and education level.

Overall, questionnaire had four major portions: Demographic data, PNKQ (Pregnancy Nutrition Knowledge Questionnaire), Sources of information , Nutrition knowledge questionnaire (General) (11)

Ethical Aspects

Before beginning the interviews with the women, a meeting was scheduled with the respective hospital administrations, during which the study plan and its goals were thoroughly discussed. Those hospitals that consented to take part in the study were asked for a written approval. A consent form was also signed by the participants for participating in the study, which informed them of the study goals and asked to follow them confidentially.

Data Collection

During the months of February and April 2019, a group of UVAS final year BS Hons Nutrition and Dietetics students performed this study. Participants were selected based on the following criteria: they live in Lahore, attend antenatal appointments, and are expecting a singleton pregnancy (to avoid the conflict of nutritional demands of multiple pregnancies). As women came in for their antenatal appointments, the researchers interviewed them in their native language (Urdu and Punjabi) and filled out questionnaires on the spot in the waiting area of the respective hospital.

Data Analysis

For the evaluation of answers, coding and analysis, SPPS (version 22) was used. The data was coded according to the maximum possible answers. The percentage was evaluated by giving each question a single score. Knowledge score was measured by the sum of correct responses. The statistics used include frequencies, percentages, mean and standard deviations. The normality was checked by Kolmogorov-Smirnov test and found to be violated.

Due to unequal distribution of data and nominal variables, the test used to access validity was Spearman's correlation (two-tailed). It was also used to determine the relationship between PNK marks and associated factors at 95% ($p<0.05$) confidence interval.

RESULTS

364 women were interviewed and questionnaires were completed. The average age (SD) of women was 26.46 (±4.7) years and 26.9% of them were bearing their first conception. The majority of participants were for a low socioeconomic background. The characteristics of participants are in Table 1

Table 1

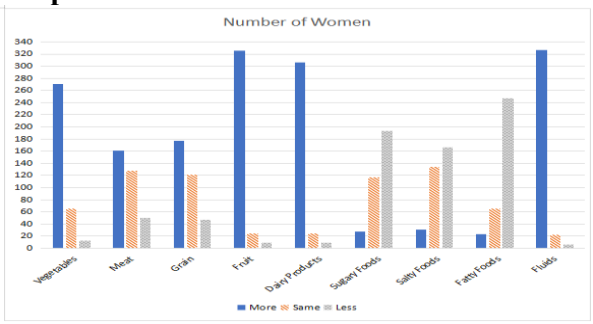
Characteristics of participants, n= 364

Factor	No of Women (%)	
Hospital		
Lady Wellington hospital	279	(77%)
Ganga ram hospital	39	(11%)
Mayo hospital	13	(4%)
DHQ Sahiwal	11	(3%)
Lady Aitchison hospital	9	(2%)
CHG	8	(2%)
Shalimar hospital	5	(1%)
Age in Years		
<25	136 (37.36%)	
25-29	130 (35.71%)	
30-34	73 (20.05%)	
35-39	22 (6.04%)	
40+	3 (0.82%)	

Pregnancy	
0-12 weeks (1st trimester)	35 (9.6%)
13-27 weeks (2nd Trimester)	128 (35.2%)
28-40 weeks (3rd Trimester)	201 (55.2%)
Number of Previous Children	
0	98 (26.9%)
1	102 (28.0%)
2	80 (22.0%)
3+	84 (23.1%)
Education	
Nil	71 (19.5%)
Under-matric	74 (20.3%)
Matric	92 (25.3%)
Intermediate	54 (14.8%)
Graduate	67 (18.4 %)
Post Graduate	6 (1.6%)
Income	
< 20,000 PKR	208 (57.1%)
20,000-40,000 PKR	123 (33.8%)
41,000-70,000 PKR	25 (6.9%)
71,000 PKR +	8 (2.2%)

Since becoming pregnant, participants were consuming more meat, fruits, fresh vegetables, milk and milk products, cereals, and fluids, according to response analysis as shown in graph 1.

Graph 1



Pregnancy Nutrition Knowledge and General Nutrition Knowledge

A positive correlation was calculated between Pregnancy nutrition knowledge and General nutrition knowledge scores (r_s=0.40, p<0.01). A weak positive correlation is found between monthly income and nutrition knowledge score related to pregnancy (r_s=0.27, p<0.05), mild positive correlation between level of education and PNK score (r_s=0.46, p<0.05) was observed and age has no association. Number of children found to have a very weak negative correlation with PNK score.

The percentage of participants who scored above 50% for pregnancy related nutrition knowledge were 4.3% (16/364) and 52% (189/364) for general nutrition knowledge. The mean score for pregnancy related nutrition knowledge was 17.4 (SD ± 5.2) out of total score of 52 and for general nutrition knowledge it was 6.4 (SD ± 2.6) out of 13. The correct answers and their frequencies are given in Table 2.

Table 2

Prevalence of right choices for each question according to the nutrition guidelines during pregnancy, n= 364

Questions	right choice	No of women	% of women
Food that experts suggest eating more , same or less throughout pregnancy:			
Meat	More	161	44.2
Grain	More	177	48.6
Fruit	Same	24	6.6
Dairy products	Same	33	9.0
Vegetables	Same	65	17.8
Fluids	More	327	89.9
Fruits and vegetables servings per day advised?			
Fruits	2	160	43.9
Vegetables	5	13	3.57
Extra fluid recommended per day?	3-4 glasses	149	40.9
Mineral or vitamin supplements experts recommend to take?			
Iron	No	29	7.9
Folic acid	Yes	257	70.6
Calcium	No	33	9
Vitamin B12	No	82	22.5
Iodine	Yes	51	14.0
Vitamin D	No	79	21.7
Vitamin C	No	70	19.2
Zinc	No	68	18.6
What experts recommend about timing of iodine supplements?	During pregnancy and breastfeeding	44	12.0
What experts recommend about timing of folic acid supplements?	before pregnancy (1 month) + first 3 months of pregnancy	169	46.4
Reason why folic acid is required?	To prevent spina bifida	73	20.0
Dose of folic acid usually recommended?	400 micrograms	17	4.6
How to meet energy requirement during pregnancy period?	Have greater amount of energy every trimester	323	88.7

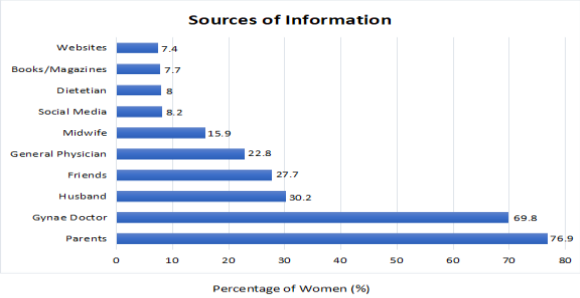
Do women need extra energy for first trimester?	No more energy required	48	13.1
Weight allowed for healthy weight pregnant women to gain during her pregnancy?	11-16 kg	51	14.0
Is weight gain allowed for overweight women during pregnancy?	A little weight gain required	78	21.4
Recommended limitation for the intake of liver due to high vitamin A in it?	Agree	30	8.2
Is it recommended to avoid vitamin A supplementation during pregnancy?	Agree	25	6.8
Harmful effect of excess Vitamin A during pregnancy?	Birth defects	22	6.0
Tell if the foods groups are high or low in folic acid?			
Spinach	High	133	36.5
Meat	Low	27	7.4
Peanut	High	52	14.2
Fruit juice	Low	106	29.1
Milk	High	35	9.6
Biscuit	Low	92	25.2
Food not a better choice for iodine?	Steak	51	14.0
Quantity of extra iron needed in pregnancy?	Increase upto 150%	47	12.9
How to increase iron in the diet during pregnancy?	Meat & Fish	140	38.4
How to increase calcium in your diet during pregnancy?	Milk & Yogurt	272	74.7
Which groups of people have low immunity and greater infection chance?			
Older people	Yes	262	71.9
Pregnant women	Yes	226	62.0
Sports people	No	140	38.4
Unborn children	Yes	165	45.3
Young people	No	110	30.2
Major health risk by eating bacterial contaminated food?	Food poisoning	360	98.9
Will Bacteria continue growing on contaminated food placed in the refrigerator?	Yes	291	79.9
Is it safe to use raw eggs during pregnancy?	No	279	76.6
Is it safe to use undercooked meat during pregnancy?	No	283	77.7
General Nutrition Knowledge			
What version of dairy foods do expert say people should eat?	Low Fat	193	53.0
Tell if these are high or low in processed sugar?			
Packaged juice	High	232	63.7
Tomato ketchup	High	166	45.6
Ice cream	High	224	61.5
Tell if these are high or low in fat?			
Pasta	Low	124	34.0
Meat	High	245	67.3
Honey	Low	166	45.6
Nuts	High	171	46.9
Bread	Low	205	56.3
Cheese	High	198	54.3
Fruit juice (unsweetened) is healthy choice instead of raw fruit?	Disagree	150	41.2
Brown sugar can be taken as an alternative to white processed sugar?	Disagree	70	19.2
A glass of whole milk has more calcium than a glass of skimmed milk?	Disagree	104	28.5

The majority of the women said they didn't know enough about healthy food and nutrition rules during pregnancy. They had less information about the weight gain targets (only 14% women reported the right answers), food groups to be focused during pregnancy, proper timing to take iodine supplements, benefits of folic acid, its significance and dose etc., the food sources of iodine and folic acid. However, they had good knowledge of; the population at risk of infections and the health risks of eating foods that are contaminated or under cooked.

Nutrition Information Sources

At the onset of the pregnancy period women gained information from different origins. General physicians, gynecologists and family members were top relied sources of information. A higher proportion of women (76.9%) indicated that they received guidance from their mothers, 69.8% from gynecologist, 30.2% from their husbands and 22.8% from general physicians while selecting the top three sources of information out of a total twelve as shown in graph 2.

Graph 2



However, 7.7% also received nutrition related information from books and magazines. Only 8% women visited the dietitian for nutrition concerns.

DISCUSSION

The health of the child is directly influenced by the mother's diet during pregnancy. Women in developing nations such as Pakistan have no adequate access to health care specialists, and as a result, they lack dietary expertise throughout pregnancy. A large percentage of women in the study were ignorant of the pregnancy diet recommendations. We need to provide people with a variety of knowledge in order to get them to change their behavior (12).

Keeping in view this fact Emmett et al. came up with an idea of wallet sized card to improve the consumption of Ω-3 PUFA in pregnant ladies (13) Women who got these educational materials were later shown to be more likely to increase their consumption of omega 3 fatty acid-rich meals.Nearly half of the women were aware that they should eat more meat and grains when pregnant. They were unaware that they should consume the same number of fruits, vegetables, and dairy products. In terms of fluid consumption, the majority of the participants were aware that they should drink more fluids during pregnancy. The fetus suffers as a result of the mother's poor diet. This either results in the alteration of gestational period or may cause risk of anemia (5).

The percentage of participants having 2 servings of fruits and 5 servings of vegetables was less than half of the total participants, which is a negative finding when compared to an Australian study that found more than half of the participants consuming the defined serving of vegetables (57%) and fruits (61%) (10). Another study, carried by Blumfield, found that pregnant women consume more fruits and dairy items than non-pregnant women (14) However, because we lacked exact food consumption data in our study, we were unable to make the comparison.

Women with little or no knowledge are likely to give birth to a child that is either large or small for gestational age and at an increased risk of iron deficiency anemia and pre-eclampsia (5). More than half participants were aware that doctors recommended folic acid during pregnancy. A small number of participants knew the function of folic acid in pregnancy, timing of folic acid supplements, and how much folic acid is required. Amelia et al. questioned 114 pregnant women in Australia and found that while all participants knew the significance of folic acid in pregnancy, only 46% knew when to take supplements and 38% knew the correct amount of folic acid (10). Another study conducted in South Australian Pregnant women (n=304) showed that 73% of the people knew the role of folic acid in pregnant ladies, 82% were aware of the proper duration of supplement while only 18% knew the required dosage (15).

The majority of women agreed that more iron is required during pregnancy, however only 12.9 % could identify the increased quantity of iron in pregnancy. This conclusion is similar with the findings of a research done in Karachi with a sample size of 372 gestating women, which discovered that 50% of the women knew the increased demand for iron during pregnancy (16). Consuming iodine supplements was less known. A few participants were educated about the usage and relevance of iodine supplementation during pregnancy and lactation. According to a research done by Martin on 200 pregnant women, 55 percent of the participants were aware of the significance of iodine in pregnancy, but only 19 percent believed that they need iodine supplementation throughout pregnancy (17).

Lucas et al. reviewed 142 pregnant women for the nutrition knowledge and came up with the results that 94% of the women knew the role of iodine in conception period while they lacked the proper knowledge of iron rich foods and the consequences they have to face if iodine supplementation is not done (18). A minimal proportion (14%) correctly identified the appropriate weight gain range during pregnancy. The results obtained in this study were consistent to the studies previously done showing the results

between 11.7% to 47%. (10, 19-21) As a result, women who are unclear of the normal range of gestational weight increase will gain more weight (22).

There was a favorable relationship between the women's degree of education and their nutritional knowledge. And this outcome is consistent with prior studies.(23,24). Furthermore, it was discovered in this study that there was a reduced relationship between nutrition awareness and gestational age. It's possible that pregnant women didn't obtain adequate dietary advice after their first prenatal appointment. It might possibly be attributable to the participants' lack of awareness regarding pregnancy-related dietary habits. Previous researches have found that women with more children had better dietary knowledge; however this was not seen in this study. This disparity might be explained by the fact that physicians and other health-care providers did not provide information to women who were already pregnant, assuming that they already knew about the dietary requirements during pregnancy, as suggested by Downs et al. (25)

All of the ladies correctly identified the hazards to the unborn baby from food contamination and the illnesses produced by bacterial infection during long-term refrigeration. Furthermore, women are aware that avoiding items such as raw eggs or undercooked chicken might compromise a pregnant woman's nutritional condition.

When asked about their primary source of knowledge, it was discovered that their primary source of information was their parents, especially their moms. The gynecologists came in second, while the spouses came in third. Previous studies investigated books, the internet, and social support as the three sources of nutritional knowledge for women during pregnancy.(26-29)

This demonstrates that women are not receiving adequate dietary guidance from health authorities. And, owing to their lack of knowledge, they are unable to obtain any type of information on their own. The study was organized by the students of Human Nutrition and Dietetics students and to avoid any kind of misinterpretation they personally interviewed the participants. The participation of the women in the study showed their willingness to get some nutritional information in pregnancy but the overall results showed that they lack proper knowledge and awareness.

LIMITATIONS

This scientific research has certain limitations that are acknowledged. First of all, the data was limited to represent whole population of Punjab, as it consisted of only major hospital visiting pregnant women. Secondly, no dietary recall was taken, all the information was based on answers of participants, and they may have underestimated or overestimated them. The data was collected from Government hospitals that are mostly accessed by low socioeconomic population of area, leading to biasness in the study. Another limitation was the barrier of communication with participants due to their low literacy level.

CONCLUSIONS

During pregnancy poor nutrition routines are a risk to health of child and mother as well. The wrong dietary habits are directly associated with the lack of nutrition knowledge among women. Health care facilities, community workers and print media provide no information regarding pregnancy related nutrition guidelines, daily caloric intake, weight gain, servings of fruit, vegetables and meat to consume, fluid requirements, vitamin supplementation and mineral recommendations to pregnant women. This study signifies that there is a huge knowledge gap in women regarding what, when and how much to eat during pregnancy. The results of this study can be used effectively to initiate more research and make interventions at policy and community level to improve knowledge of women and ultimately to ensure better child-maternal health.

List of Abbreviations

NHMRC: National Health and Medical Research Council; PNKQ: pregnancy related nutritional knowledge questionnaire; SPSS: statistical package for social sciences

Declaration

Ethical Approval and Consent to Participate

The study does not involve any clinical trials of foods and physical activity patterns rather it’s a survey designed to assess the dietary habits, therefore, ethical approval was not required for this study. Only the consent of participants was needed.

A written consent was taken from all participants in the start of study.

Consent for Publication
Not applicable.

Availability of Data and Materials
Data which support the findings of study is included in the article. Data generated and analyzed during the research could be available on request by the corresponding author.

Authors contributions
AK designed the study. The questionnaire was taken from previous study and was modified by QA. QA collected the data. QA analyzed the data with the assistance of AK. QA reviewed the literature and wrote the first manuscript; QA had the primary responsibility of content and interpreted the data. AK reviewed and finalized the manuscript.

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