ORIGINAL ARTICLE

Assessment of awareness, attitude and practices regarding dietary iodine in pregnant women: a cross sectional survey

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ABSTRACT

Context: Iodine deficiency can impair brain development both in natal and post natal life. There is high prevalence (52%) of iodine deficiency among women of reproductive age in urban areas.
Aims: The purpose of this study is to explore knowledge, prevalent attitude and practices about Iodine consumption in pregnant females of a local community in Lahore, Pakistan.
Settings and Design: Cross-sectional study based on non-probability convenient sampling technique. Pregnant women (n=400) of any age have been targeted to respond for the survey.
Methods and Materials: The study population consisted of pregnant women presenting in the outdoor department of Shalamar Hospital, Lahore. Data were obtained by face-to-face interviewing using a structured questionnaire. The data was collected during the three months period from September to November 2011.
Statistical analysis used: The analysis was done on SPSS version 13
Results: Awareness of the undesirable health effects of insufficient iodine intake during pregnancy and lactation was poor among the participants almost 95% of mothers, did not know what has been recommended as a daily dietary allowance (RDA) of iodine during pregnancy and lactation. Only 4% of the respondents identified correctly all the good sources of iodine such as fortified salt (88.6%), marine fish (49.9%) and milk (39.5%), from a given list of sources. Vegetables (51.7%) and fruits (35%) were most incorrectly regarded good sources of iodine, whereas, poultry/meat (74.5%) and fruits (65%) were most correctly recognized not good sources of iodine. inaccurately identified good sources of iodine included cheese (75.6%), yogurt(75.3%) and milk (60.5%). Almost 43% of the respondents disregarded that iodine deficiency disorders exist in their vicinity, whereas, 72.5% of women surveyed, reported that iodized salt was being used in their households.
Conclusions: The health knowledge of pregnant women regarding; recommended daily dietary allowances of iodine during pregnancy and lactation, good sources of iodine, dietary supplementation of iodine during pregnancy and lactation, and awareness about common deficiency diseases of iodine was limited. Health education regarding increased iodine requirement during pregnancy and lactation by supplementation of pregnant women is required to improve the iodine status of pregnant females.
Key Messages: Nutritional health education by gynecologists, nurses and paramedical staff regarding increased iodine requirement during pregnancy and lactation by supplementation of pregnant women is required to improve the iodine status of pregnant females.

Key-words: Health knowledge, attitude and practices, Iodine, Pregnant Women

INTRODUCTION

Iodine is a trace element that is crucial for human growth and development, due to the dependence of the thyroid gland on iodine for the production of the thyroid hormones tri-iodothyronine and thyroxine.[1] A diet deficient in iodine can lead to both mental and physical disorders.[1] During pregnancy as there is an increased demand on the mothers' body to provide adequate nutrition, she increases production of thyroxine to maintain her euthyroid state while supplying thyroid hormone to the fetus.[1] Iodine deficiency can impair brain development both in natal and post natal life.[2] The deleterious effects of iodine deficiency range from a mild reduction of intellect to severe mental retardation (cretinism).[1] Even mild iodine deficiency during pregnancy may result in reductions in intelligence quotient and auditory function.[1]

World Health Organizations estimates that 1.6 billion people in 130 countries live in areas where they are at risk of being deficient in iodine, whereas about 300 million already suffer from lowered mental ability as a result of iodine deficiency.[3] Moreover, each year 120,000 children born are cretins, mentally retarded, physically stunted, deaf-mute or paralysed due to lack of iodine.[3] Also, an anticipated yearly total of 60,000 miscarriages, stillbirths and neonatal deaths occur due to severe iodine deficiency during early pregnancy.[3] In 2009, Aga Khan University and UNICEF estimated over 70% of the Pakistani population to be at risk of Iodine deficiency disorders, 76% of women and 64% of the general population of Pakistan are iodine deficient.[4-5] This reported level of iodine deficiency has tremendous developmental costs on the country.[4] Correction of iodine deficiency is indicated as a major contribution to human development.[6]

The problem of iodine deficiency disorders persists even in presence of salt fortified with iodine.[4] The main intervention strategy for control of iodine deficiency disorders is universal salt iodization.[3] Iodine supplementation is limited to populations living in areas of severe deficiency or who are difficult to reach, and for specific groups such as pregnant women and young children.[7] Results of urinary iodine analysis have shown that; about 34% reproductive age women were found to be iodine deficient; 14.6% were severely iodine deficient and 19.2% moderately deficient.[4] There is high prevalence (52%) of iodine deficiency among women of reproductive age in urban areas.[4] The main aim of this study, therefore, was to assess pregnant Pakistani women's health knowledge, attitude and practices related to iodine nutrition in Shalamar Town of Lahore.

MATERIAL AND METHODS

This was a cross-sectional study based on non-probability convenient sampling technique. The objectives of the study were met using quantitative research methodology. The study population consists of pregnant women presenting in the outdoor department of Shalamar Hospital, Lahore. Data were obtained by face-to-face interviewing using a structured questionnaire. Interviews were carried out in outpatient department of antenatal clinic of Shalamar Hospital, Lahore. The estimated total population of Shalamar Town, Lahore is approximately 530,000 individuals.[8] Pregnant women of any age were targeted to respond for the survey. The status of pregnancy was confirmed by either ultrasound scan or beta human chorionic gonadotrophin levels. The sample size to conduct this survey for target category was calculated through the following formula:

$n = z2\ 1\text{-}\alpha/2\ p\ (1\text{-}p)\ /d2$

Where,

α = Level of confidence: 95%

p = anticipated population proportion for correct knowledge: 50%

d = Absolute precision required on either side of the proportion: 5%

A sample of 385 individuals was selected. Thus a total number of 400 interviews were carried out. The interviewers oriented the interviewees on the ethical issues. It was made sure that the survey is conducted solely on the willingness of the subject. An informed consent form was filled and signed in by the interviewees. The interviewees were ensured about their confidentiality, anonymity and privacy. The survey was conducted according to the rules and regulations mentioned by the Ethical Committee of the Department of Community Medicine, Shalamar Medical and Dental College.

ETHICAL CONSIDERATIONS

Permission was obtained from the ethics committee of Shalamar Institute of Health Sciencs.

RESULTS

Participant's Socio-demographic Characteristics

The interviews were conducted on 400 pregnant participants in the antenatal clinic of the outdoor department of gynaecology and obstetrics in Shalamar Hospital, Lahore. The mean age of participants was 26.2 (±4.1 SD) with the minimum and maximum age being 17 and 40 respectively (Table 1). The highest proportion of the participants were educated bachelors and above 40.5% (n=162), whereas, almost an equal percentage of participants were matriculate 22.8 (n=91) and intermediate 23% (n=92). A relatively smaller proportion 13.8% (n=55) of participants was educated to middle or below standards (Table 1). Almost 77.7% (n=311) participants included in the study resided in the geographical boundaries of Shalamar Town, Lahore.

Participants' Reproductive Characteristics

Of all participants 55% mothers had previous children prior to the current pregnancy. 44% of mothers were primigravida. Among all the participants 18.75% had suffered at least one miscarriage, whereas, 5.25% suffered 2 miscarriages (Table 2).

Awareness

The data revealed no statistical significance in iodine knowledge, when analysed according to different variables like, age, level of education, number of pregnancies, children and miscarriages. The knowledge of good dietary sources of iodine was poor. Not more than 4% of the participants identified correctly all the good sources of iodine such as fortified salt (88.6%), marine fish (49.9%) and milk (39.5%), from a given list of good sources i.e. eggs, fortified salt, milk, marine fish, cheese and yogurt. Vegetables (51.7%) and fruits (35%) were most incorrectly regarded good sources of iodine, whereas, poultry/meat (74.5%) and fruits (65%) were most correctly recognized not good sources of iodine. Inaccurately identified good sources of iodine included cheese (75.6), yogurt (75.3%) and milk (60.5%). There has been a high level of confusion regarding good sources of iodine among respondents (Table 4).

Barely 4% of the pregnant women recognised all the correct iodine deficiency disorders from a given list. The most commonly identified iodine deficiency diseases in order of predilection were goiter (69.8%), impaired physical development (47.0%), mental retardation (43.5%), thyroid diseases (38.8%), malformation/ congenital anomalies (38.3%), foetal death (12.8%) and neural tube defects (12.8%).

Practices

A good 87.5 % of pregnant females visiting the gynecology and obstetrics department admitted taking dietary supplements .Iodized salt was being used in 72.5% of households according to the women surveyed, whereas, 25.3% denied the usage of iodized salt. Over half of the respondents (52.3%) had made no change to their diet to include iodine since becoming pregnant. Of those consuming dietary supplements, most were consuming folic acid (67%) and iron (63%) only preparations. Those taking multivitamins (20.3%) were only a handful and it was not clear how many of them had iodine in their multivitamin preparations. Majority (89%) of those who changed their diets to include iodine were educated at least to matriculation. Though, upon analysis this study failed to infer any association between level of education and changing the dietary habits to include iodine because it was not found significant as ($P = 0.124$). The effort to explore the association between the education and use of iodine salt were also not rewarding as analyses of the results suggest only a borderline significance of association between the said variables ($P = 0.053$). The study was also futile in finding an association between variables like miscarriages and level of education ($P = 0.541$); and exclusive breastfeeding of child for six months and level of education ($P = 0.0438$).

Regarding their knowledge of dietary requirements during pregnancy concerning Zinc only 4 % had been informed about the increased need for zinc in pregnancy while 95.8% had been given no such information (Figure 3). Only 7.8% had been informed about the increased need of iodine during pregnancy. This number gradually rose to 36.3 % when concerning information given about vitamin need in pregnancy. In contrast, 66.8%, 62.5%, 74.3% of pregnant females were informed about folate, iron, and calcium needs during pregnancy respectively. This suggests that the dissemination of information regarding iodine supplementation during pregnancy and lactation has not been the priority of the para-medical staff (Figure 2).

When it came to the dissemination of information regarding nutritional health in pregnancy, no materials (flyers, pamphlets, etc) regarding nutritional health were found in the antenatal clinic. The participants acknowledged doctors (76%), family members (29.3%) and the media (15.8%) respectively as the main sources of nutritional health information. The source least quoted for nutritional information was paramedical staff (2.3%) (Figure 2). From those who were getting advice regarding nutrition from a health care professional 48.5% were given written information and a further 46.3% were given verbal advice.

Attitudes

When asked, if the participant thought that iodine deficiency is a common health problem in her vicinity, 30% believed that it was and 43.3% disagreed whereas, 26.8% did not know the answer (Figure 3). A huge number of the respondents (65%) believed that iodine intake

should be increased during pregnancy and lactation, whereas almost 29% of the respondents had no idea whether it should or should not be. A small number of participants (6%) believed that iodine intake should not be increased during pregnancy and lactation. Almost 40% of pregnant females believed that iodine supplementation should be used to increase iodine intake during pregnancy and lactation.

Table 1: Participant's Socio-demographic Characteristic (n=400)

Participant's Socio-demographic Characteristic	**Percentage/ Number**
Mean age	26.2% (±4.1 SD)
Highest Education Level	
None	4% (n=16)
Primary	3.5% (n=14)
Middle	6.3% (n=25)
Matriculation	22.8% (n=91)
Intermediate	23% (n=92)
Bachelors and above	40.5% (n=162)

Table 2: Participants' Reproductive Health Characteristics (n=400)

Reproductive Health Characteristics	**Percentage/ Number**
Mean gestational age	173.4 days (±67.9 SD)
Primigravida	44%
Parity	
None	44.75% (n=179)
1 child	25.25% (n=101)
2 children	17.75% (n=71)
3 or more children	12.0%(n=48)
Miscarriages	
None	74.25% (n=297)
1	18.75% (n=75)
2 or more	6.75 %(n=27)
Pregnancies	
1	36.5% (n=146)
2	25.5% (n=102)
3	19% (n=76)
4 or more	17% (n=68)

Table 3: Association of education of mother and number of children with micronutrient and Iodized salt intake (n=387)

	Education of the Mother				
	≤12 years (N=233)		**>12 years (N=154)**		
	n	**(%)**	**n**	**(%)**	**p-value**
Taking Folate	145	(62%)	115	(75%)	**0.01***
Taking Iron	146	(63%)	102	(66%)	**0.52**
Taking Calcium	160	(69%)	122	(79%)	**0.03***
Using Iodized salt	167	(72%)	116	(75%)	**0.30**
	Number of Children				
	One child (N=98)		**Two or more (N=53)**		
Using Iodized salt	70	(71%)	92	(79%)	**0.27**

Table 4: Foods identified by participants as good or not good sources of Iodine (n= 377), did not respond (n=23).

Foods	**identified by participants as good source of iodine**	**identified by participants as not a good source of iodine**
*Eggs**	36.6%	63.4%
*Fortified Salt**	88.6%	11.4%
Vegetables	51.7%	48.3%
*Milk**	39.5%	60.5%
*Marine fish**	49.9%	50.1%
Poultry /meat	25.5%	74.5%
Fruits	35.0%	65.0%
*Cheese**	24.4%	75.6%
*Yogurt**	24.7%	75.3%

Almost 42.8% were confident they were getting an adequate amount of iodine in their daily diet and more or less an equal percentage (41.3%) did not know if they were receiving an adequate

supply of iodine in their diet. On the other hand, 16% were not confident that they were in-taking an adequate amount of iodine to meet their needs.

Figure 1: Percentage of participants who were informed about the nutritional needs of specific substances during pregnancy

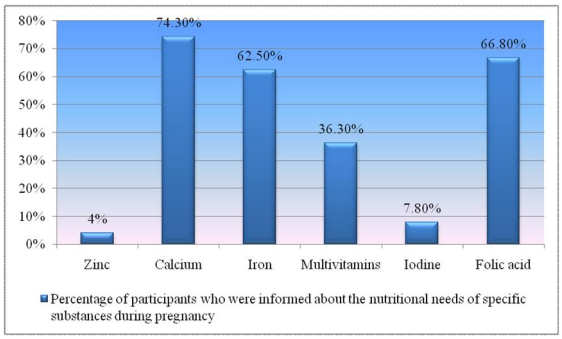


Figure 2: Percentage of participants who reported the sources which provided them with nutritional health information during pregnancy

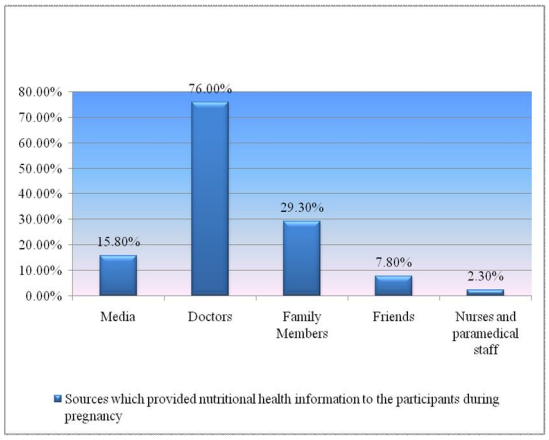
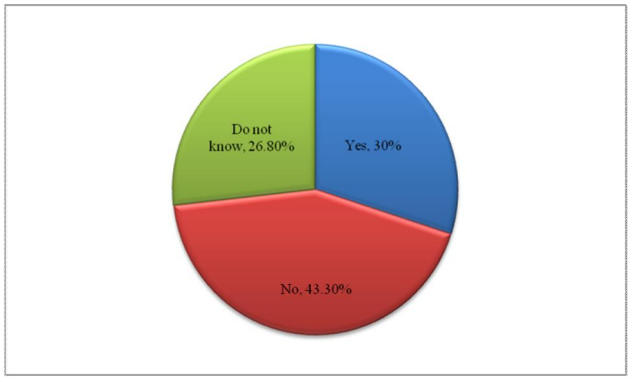


Figure 3: Pie chart depicting percentage of participants who believed that Iodine deficiency is a common health problem in their vicinity



DISCUSSION

United Nations Children's Fund (UNICEF), International Council for Control of Iodine Deficiency Disorders (ICCIDD) and World Health Organization (WHO) recommend that the daily intake of iodine should be 250 µg for pregnant and lactating women.[1,9-10] This survey suggests that a massive proportion of the participants i.e. almost 95% of mothers, did not know what has been recommended as a daily dietary allowance (RDA) of iodine during pregnancy and lactation. The dietary content of iodine in typical Pakistani diet is reported to be 60 mg/day. [11] A study in 2009 reported that excluding the iodine intake from sea food and water, this daily intake is further reduced to 40 mg/day.[11] A very small proportion of 2.5% of mothers answered the question of RDA of iodine in pregnancy correctly. An even smaller proportion of 1.8% answered accurately the RDA of iodine during lactation. It can be argued that the intake of iodine can be improved in populations, especially pregnant population by educating them with the appropriate daily recommended allowance of iodine.

The low iodine content of the Pakistani diet might be due to the dietary habits of the Pakistani people, to diet composition (mainly a lack of sea food), to the natural environment of the country (lack of iodine in the Pakistani soil) and to iodine losses during cooking.[11] Seafood is characteristically a good source of iodine because of the fact that the ocean is rich in iodine.[12] A survey on eating habits of Pakistanis claims that in general the use of red meat (59%) outweighs the use of white meat (39%) in Pakistani households.[13] Moreover, eggs are also regarded as a good source of iodine.[1] Eggs being the right response were answered correctly by 34.4% only. The mammary gland concentrates iodine therefore dairy products are generally a good source, but only if the cows get enough iodine. [12] Milk was regarded as good sources of iodine by only 37.3% of respondents whereas; cheese and yogurt were correctly identified by only 23% of the participants. Edible salt does not contain iodine in nature; it is added on purpose to improve iodine nutrition so fortified salt was given as an option in the question concerning sources.[12] Though 88.6% of the participants regarded fortified salt as a good source of iodine, 11.4% still could not correctly identify fortified salt as a good source of iodine. As 89.6% of those who correctly identified fortified salt as a good source were educated above

matriculation, this can be attributed to lack of education.

A good 43.3% of the respondents disregarded that iodine deficiency disorders exist in their vicinity, whereas the World Health Organizations' data showed an overall rate of 63% Iodine deficiency in the year 2007 in Rawalpindi, Pakistan.[14] In a cross-sectional survey conducted in Sindh in 2007 to assess the use of iodized salt at household level and iodine deficiency status among under-five children and women of reproductive age, the observed use of iodized salt was calculated to be 21.0%.[4] There was a difference between the observed (21%) reported (39.4%) and actual (8.4%) usage of iodized salt at household level.[4] This had been credited to the lack of health knowledge and non availability of the fortified salt.[4] Also, according to UNESCO (The State of World Children 2009), the prevalence of Iodized salt in Pakistan was only 17%in 2009.[4] According to the National Nutrition Survey (NNS) Report 2011, the proportion of households using actual iodized salt in Pakistan was 69%, while the actual use of iodized salt was higher (72%) in urban areas than in rural areas (68%).[15] The NNS 2011 admits not attaining any gains in iodine status nationally following the implementation of a universal salt iodization and promotion strategy.[15] The results of the NNS report 2011 correspond well with the results of this study which reveal that 72.5% of women surveyed, reported that iodized salt was being used in their households and 25.3% denied the usage of iodized salt (Figure 2).Although, it can well be argued that the actual iodised salt usage was never measured in this study which can lead to such a higher prevalence of iodized salt. This can be said as one of the limitations of the study.

The multiple indicators cluster survey Punjab (2007-2008) analyzed the percentage of households consuming adequately iodized salt (>15 parts per million) in Punjab.[16] Salt used for cooking was tested for iodine content in 99 % of surveyed households using salt test kits and testing for the presence of potassium iodide.[16] Salt was adequately iodized in only 6 per cent of households of Punjab (2 % less than the findings of Punjab MICS 2003–04).[16] The use of adequately iodized salt fluctuates greatly among districts, areas of tenancy and wealth quintiles.[16] The survey results suggest that among 15,242 households of Lahore city in which the salt was tested for iodine content , only 15.7% were consuming adequately iodized salt which contained more than15 parts per million.[16] 73.5% of the households were consuming salt which had zero parts per million of iodine.[16] A report by Gallup Pakistan on thirty years of polling on eating habits of Pakistanis maintains that a third of the Pakistani population is still not aware about the benefits of iodized salt.[13] 66% of Pakistanis regarded iodized salt to be beneficial for health, 5% believed it to be injurious and 16% said they were not aware about it.[13] The report further reflects that only 40% of Pakistanis claim using iodized salts daily in their diet, 36% sometimes use it and 23% never use it.[13] Regardless of the incessant media drive for promoting use of iodized salt, only 47% Pakistanis admit that they have seen the 'hand on a handi' sign in any ad on TV/Newspaper.[13]

NNS 2011 survey finding revealed that 67% respondents mentioned that iodized salt is the major source of iodine however very limited (2.4%) awareness about other iodine rich food like fish/sea food. [15] In comparison, this data reveals that marine fish was recognized as a good source of iodine by 49.9 % of pregnant females. The NNS reports that around 76 % mothers in FATA 70 % in Sindh, 68% in rural Pakistan and 65 % in AJK were not aware about iodine deficiency disorders.[15] In contrast the data of this study revealed that only 4% of the pregnant females from the sample population correctly identified the iodine deficiency disorders from a given set of diseases, this therefore reveals that almost 96% of pregnant females were unaware of the exact diseases that are caused by iodine deficiency.

Very few respondents were informed about the nutritional needs of the specific substances like zinc (7%) and iodine (4%) respectively. From our subject group 51.5% intended to take the dietary supplements till delivery or throughout pregnancy, whereas only 9.3% of the participants planned to take the supplements throughout pregnancy and lactation. 25.5% of the participants were unsure about the duration of supplementation but were going to follow the doctor's advice or prescription. 76% of the respondents acknowledged that their doctors provided them with specific nutritional health information. On the other hand only 2.3% accredited the role of nurses and paramedical staff in dissemination of nutritional health information. It can be argued that the preferred source of information regarding nutrition health for a pregnant female is her gynaecologist, but the initial

points of contact to a pregnant female for antenatal care are her family, lady health visitors and nurses and paramedical staff. Nurses and paramedical staff should be trained to disseminate the nutritional health information which includes iodine supplementation during pregnancy and lactation.

CONCLUSION

Iodine deficiency is recognized as the most important preventable cause of neurological and mental defects in the world today.[1] Strict measures should be employed to counteract this deficiency, ensuring use of iodine fortified salt, and consequent prevention for mental health defects.[4] The health knowledge of pregnant women regarding; recommended daily dietary allowances of iodine during pregnancy and lactation, good sources of iodine, dietary supplementation of iodine during pregnancy and lactation, and awareness about common deficiency diseases of iodine was limited. Health education regarding increased iodine requirement during pregnancy and lactation by supplementation of pregnant women is required to improve the iodine status of pregnant females. Nurses and paramedical staff should be trained to spread the nutritional health information which includes iodine supplementation during pregnancy and lactation. Presence of health education materials like flyers and pamphlets which clearly describe the role, requirements, time of initiation and deficiency states of micronutrients in all gynaecological and obstetrical outdoors and antenatal clinics should be emphasized. The attending gynaecologists should also guarantee that proper nutritional advice of pregnancy has been delivered to the expectant.

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