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Facilitating Knowledge of Women on Importance of Iodine in Foetal Brain Development through Nursing Education: An Evidence-Based Educational Intervention

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Abstract

The purpose of the evidence-based practice educational intervention was to a) assess the knowledge of women on the importance of iodine in fetal brain development b) find the effectiveness of planned teaching program on women. Iodine Deficiency Disorders can impact on people of all ages, but most severely on the baby while it is developing in the womb. During pregnancy, it can cause maternal and fetal hypothyroidism and impair neurological development of the fetus. This study showed that women did not have enough knowledge regarding the importance of iodine in fetal brain development. So there was lack of knowledge in some aspects regarding the importance of iodine in fetal brain development among women residing in the rural area The nurses have an influential role in imparting knowledge on the importance of iodine in fetal brain development. They can utilize their opportunities to spread awareness about the importance of iodine deficiency disorders leading to brain damage. Providing EBP educational intervention on this topic positively impacted on their knowledge. The findings underscore evidence-based nursing is one approach that may enable future healthcare providers to manage the explosion of new literature and technology and ultimately may result in improved patient outcomes. Hence it helps to implement in their caregiving as a nurse educator, midwife, and as public health nurse.

Keywords: ***Iodine, Foetal brain development, nursing education, women, Evidence based practice, Educational intervention.***

Introduction

Dietary Iodine is a key nutrient in neurodevelopment, and the fetus is entirely dependent on the iodine intake of the mother to fulfill this important requirement for proper brain function. Iodine Deficiency Disorders (IDDs) can impact on people of all ages, but most severely on the baby while it is developing in the womb.[1]

Studies illuminate that, iodine supplementation before or during early pregnancy eliminate new cases of cretinism, increases birthweight, reduce rates of perinatal and infant mortality. In 2017, WHO recommended that pregnant women should consume 250 mg iodine daily and 2011, the American Thyroid Association (ATA) suggested that this implementation might differ from countries.[2] A country like India, because of its large population, high birth rate and iodine deficit soils, has until recently had a large number of infants potentially exposed to in utero iodine deficiency. Recent studies highlight the presence of iodine insufficiency among Indian women.[3]

The global iodine status has improved markedly during the past decade, but still, 1.88 billion people of the global population are estimated to have insufficient iodine intake.[4]

About 41 million newborns a year remain unprotected from the enduring consequences of brain damage associated with iodine deficiency.[5] Southeast Asia has the largest population with inadequate iodine intake globally and 76 million school-age children in the region have low iodine intake. In India, every year 8.1 million newborns and 8.9 million pregnant mothers are at risk of IDD due to insufficient iodine intake.[6]

A review of available studies from India showed significant iodine deficiency in pregnant women suggesting that pregnant women be included as a vital component of the National program on control of IDD in India.[7]

Iodine Deficiency Disorder is significant public health problem in 130 countries affecting 740 million people, and an estimate done one third of the world's population is currently exposed to its risk, iodine problem decreased from

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110 to 54 between 1993 and 2003 still in several studies conducted around the world, the pregnant women have been found to be particularly vulnerable to IDD most probably due to increased demand and other physiological adaptation.[8]

Recent studies have confirmed that there is a transfer of maternal T4 early in pregnancy. It would seem that the early effects of iodine deficiency on the fetus are mediated by reduced transfer of maternal T4 before the onset of fetal thyroid function. Since the dependency of the development of fetal brain on the maternal thyroid hormone is in the first trimester of pregnancy, any iodine deficiency of the mother would result in low maternal and fetal thyroxin level. During the second and third trimesters of pregnancy, the fetus is able to synthesize his own thyroid hormone. But the lack of iodine during this period would also cause insufficient thyroid hormone synthesis, in turn, leads to hypothyroidism and brain damage.[9]

Globally iodine deficiency is one of the fourth major nutritional deficiency disorders and is the single most common cause of preventable mental retardation and brain damage. About 2.2 billion people i.e., 38% of the world's population live in iodine-deficient areas. Although iodine supplementation has virtually eliminated endemic goiter in the United States, NHANES assessments over the past 30 years have suggested that dietary iodine intake has decreased especially among women of childbearing age7. The most well-known effects of IDD are visible goiter and cretinism, a condition characterized by severe brain damage occurring in very early life. WHO says Iodine deficiency is the world's most prevalent, yet easily preventable, a cause of brain damage.[10]

Endemic cretinism, caused by severe iodine deficiency during pregnancy, is a major cause of mental retardation in some parts of the world. Despite iodine supplementation programmes, endemic cretinism is still found in southern and Eastern Europe and is common in Asia, Africa, and Latin America. The prevalence may be as high as 10% in some communities. In 1990, the World Health Organization estimated that 20 million people in the world had preventable brain damage due to the effect of iodine deficiency on fetal brain development.[11] Even if iodine deficiency may be more severe in developing countries, it equally affects developed and developing countries. In 58th World Health Assembly passed a resolution to urge a renewed effort from the international community including WHO and UNICEF, to address iodine deficiency in the 54 countries most affected.

The workshop stressed the need to generate more public awareness on IDD and the importance of proper storage and consumption of iodized salt. But even when the ban was not in place, almost all of Kerala's households were consuming iodized salt. Yet the prevalence of goitre is high in the State, possibly because of some dietary peculiarities of Keralite.[12]

The nurses have an influential role in imparting knowledge on the importance of iodine in fetal brain development in women. They work in various settings such as rural and urban community settings, hospital settings and many other areas; they can utilize these opportunities to spread awareness. The purpose of the study was to a) assess the knowledge of women on the importance of iodine in fetal brain development b) find the effectiveness of planned teaching program on women.

Methodology

Research Design

In a view of the nature of the problem and to accomplish the objectives of the study, one group pre-test – post-test pre-experimental design with evaluative approach was used to evaluate the effectiveness of planned teaching program. The first-day pre-test was given to assess the existing level of knowledge using a structured interview schedule. The planned teaching program was also administered on the same day following the pre-test. On the sixth-day post-test was conducted to assess the gain in the knowledge using the structured interview schedule

Variables

Planned teaching program on the importance of iodine in fetal brain development is an independent variable and the knowledge of women is the dependent variable.

Population and Sample

The present study was conducted among 150 antenatal women from a selected rural area at Kottayam District, Kerala

Tool

A structured interview schedule was prepared to measure the dependent variable before and after the administration of planned teaching program. The areas focused on the concept of iodine, sources, and requirements of iodine, effects of iodine deficiency and iodine on fetal brain development. Reliability of the interview schedule was ascertained by the split-half method using Spearman's Brown Prophecy formula. The investigator also developed a planned teaching program on the importance of iodine in fetal brain development. Pre-testing of the tool and planned teaching program was conducted among five women to know the feasibility, ambiguity, and clarity of items and teaching program. Data collection for the main study was conducted at Kottayam District, Kerala from 20th June to 22nd July 2017.

Data Analysis

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Data were entered manually in a database. The overall database was cleaned, and descriptive statistics were calculated for all outcome variables. Results were expressed as mean and standard deviation for parametric continuous data median for nonparametric continuous data. Significance of difference between pre-test and post-test knowledge score was statistically tested by using paired "t" test and the knowledge score of women in relation to selected demographic variables were compared and tested statistically using "chi-square test.

Results

A total of 150 women took part in the survey, 62% were in the age group of 25-35 years. Majority of the participants were unmarried (84%) and had school level education (62%). 66% of participants from the nuclear family and 34% from the joint family. Dietary pattern of the respondent revealed that 86%belonged to the mixed diet and 14% were using the only vegetarian diet. When 82% of the women are using iodized salt 18% women, not in usage of iodized salt (Table1)

Assessment of the level of knowledge on the importance of iodine in fetal development revealed that majority (74%) of the participants had poor knowledge and none of them had excellent knowledge. (Table2).

The findings revealed that the knowledge of women in most of the areas of iodine in fetal brain development was poor. Analysis of the correct responses related to knowledge of sources and requirement of iodine revealed that majority (60%) of women knew that iodine need more in all age group. It was observed that only 20% of the respondents had correct response for the statement iodine is rich in sea foods. This revealed that knowledge of women on concept of iodine was poor. Correct responses of women regarding effects of iodine deficiency revealed that 44% of the mothers know that an iodine deficiency disorder includes goitre.

Table 1: Basic Characteristic of the participants

Demographic data	***n***	***%***
Age		
15-25	6	12
25-35	31	62
35-45	13	26
Marital Status		
Married	8	16
Unmarried	42	84
Education		
Illiterate	8	16
SSLC	31	62
Pre degree	3	6
Graduation	8	16
Type of Family		
Nuclear	33	66
Joint	17	34
Source of Information		
Mass Media	9	18
Academic Education	7	14
Health personnel	34	68
Dietary Pattern		
Vegetarian	7	14
Mixed Diet	43	86
Usage of iodized salt		
Yes	41	82
No	9	18

Area-wise analysis of the knowledge score was more 40% in the area ‘knowledge related to the concept of iodine’ and ‘knowledge related to effects of iodine deficiency’. Least percentage of 37.08 in the area of ‘knowledge related to iodine in fetal brain development’. It showed that women did not have enough knowledge regarding the importance of iodine in fetal brain development. So there was lack of knowledge in some aspects regarding importance of iodine in fetal brain development among women residing in rural area

The mean percentage of the total score of the pretest was 38.8% with mean□SD of 15.52□1.705, which increased to 72.90% after administration of the PTP with the mean

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percentage of knowledge score in the post-test with mean□SD of 29.16□1.765. A

Significant difference (t=43.571, p<0.05) was found between pre-test and post-test knowledge scores of women on the importance of iodine in fetal brain development. It showed the effectiveness of health education program for women to improve their health and to prevent irreversible brain damage related to iodine deficiency. (Table 3)

The association between knowledge and selected variables revealed that there was significantly no association between knowledge and demographic variables such as age, marital status, educational status, occupation, type of family, the source of information on health aspects, dietary pattern and usage of iodized salt.

Table 2: Assessment of the level of existence knowledge among women on importance of iodine in fetal brain development

Level of knowledge	*Percentage range of score*	*No of respondent*	*Percentage*
Poor	**>40**	**38**	**76**
Average	**41-60**	**10**	**20**
Good	**61-80**	**2**	**4**
Excellent	**81-100**	**-**	

Table 3: Significance of difference between pre-test knowledge & Post-test Knowledge score

Areas of knowledge	*Mean effectiveness*	*"t" value*	*Table value*	*Level of significance*
Concept of iodine	2.94	28.1	2.01	p<0.05 S
Sources and requirement	**3.08**	**19.60**	**2.01**	p<0.05 S
Effect of iodine deficiency	**4.15**	**23.55**	**2.01**	p<0.05 S
Effect of iodine in fetal brain development	**3.91**	**20.95**	**2.01**	p<0.05 S
Total	**14.08**	**43.57**	**2.01**	p<0.05 S

Discussion

This study found a lack of knowledge about the importance of iodine in fetal development women. Previous studies in New Zealand, the United Kingdom, and Australia have also found that pregnant and lactating women have little knowledge about iodine.[13] It was observed that 80% of the respondent had difficulties identifying the most important dietary iodine sources. The results for the correct dietary sources of iodine in the present study, such as fish and seafood are similar to other studies.[14]

A Descriptive study was conducted to assess knowledge, beliefs, and practices regarding iodine deficiency Disorders in Andaman and Nicobar Islands. In a total of 114 persons were interviewed, no one had correct knowledge of the cause of goiter. The study concludes that at present the community is a passive participant in the I.D.D. Control Programme hence the awareness about IDD needs reinforcement.[15]

A cross-sectional study conducted in rural areas in Mali. showed that most women of 60% had the visible goiter, and only 9% were classified as without goiter. Only 39% of the households were using salt with any iodine, and level of knowledge about iodized salt was low. Researcher further concluded that goiter is more prevalence in women and need to increase their knowledge on iodized salt.[16]

Assessment of the level of knowledge on the importance of iodine in fetal development in this study revealed that majority (76%) of the participants had poor knowledge and none of them had excellent knowledge. Similar to this study, a community-based survey conducted in Orissa, India to determine the status of iodine nutrition and knowledge of iodine deficiency disorders showed over 80% of respondents did not have knowledge of IDD and were not aware of salt iodization. Study result showed moderate iodine deficiency with poor community knowledge of iodine nutrition. There is need to strengthen the monitoring of salt iodization and intensive education activities in the females.

A review of available studies from India showed significant iodine deficiency in pregnant women. Since iodine deficiency occurring in early pregnancy shows problems in visual attention, visual processing and gross motor skills in the offspring, the need to conduct national level programs to give awareness about the importance of iodine in foetal brain development is very essential.

The association between knowledge and selected variables revealed that there was significantly no association between knowledge and demographic variables such as age, marital status, educational status, occupation, type of family, the source of information on health aspects, dietary pattern and usage of iodized salt.

In the present study, a significant difference was found between pre-test and post-test knowledge scores of women on the importance of iodine in fetal brain development. An evaluative study conducted in Udupi district, on the effectiveness of planned teaching program on 32 caregivers

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revealed that there was a significant increase in the post-test score after the teaching programme.64

A study was conducted to evaluate the effectiveness of PTP regarding the prevention of nutritional anemia in adolescent girls (n=150) of selected colleges at Mangalore. Multistage sampling technique was used for selection of participants. The study revealed that the mean percentage in post-test increased to 90.75% after the administration of PTP from the mean percentage pre-test score of 48.25%. Paired't' test showed a very high significant difference ($P < 0.001$) between pre-test and post-test knowledge scores, which indicated that a PTP was very effective in improving the knowledge.65 Evidence-based nursing is one approach that may enable future healthcare providers to manage the explosion of new literature and technology and ultimately may result in improved patient outcomes. Nurses are the more often available as resource persons than physicians and Dieticians. Hence it helps to implement in their caregiving as a nurse educator, midwife, and as public health nurse. With this nurse can also contribute to achieving the objectives of global elimination of brain damage caused by iodine deficiency disorder and National Iodine deficiency Control Program.

Role of Evidenced based Nurse

The nurses have an influential role in imparting knowledge on the importance of iodine in fetal brain development. They work in various settings such as rural and urban community settings, hospital settings and many other areas; they can utilize these opportunities to spread awareness about the importance of iodine in fetal brain development in the elimination of iodine deficiency disorders leading to brain damage.

Nursing education plays an important role in preparing the nurse for the wellbeing of the people in various areas. To provide effective nursing care in the contemporary practice setting, nurses require broad knowledge base and understanding. This knowledge base for nursing practice can be developed through nursing education. Nurses should have thorough knowledge regarding the importance of iodine in fetal brain development so that she can explain and motivate women to incorporate the same into practice. This can be done by integrating the importance of iodine in fetal brain development knowledge into all levels of curricula in nursing education. The findings would help the nurses to develop an insight into the importance of health education in the elimination of iodine deficiency disorders cum brain damage in the fetus with low iodine level mothers.

Nursing administration can plan various in-service training programmes for the staff of maternity wards and clinics to make them aware of the importance of iodine in fetal brain development. Also, they can initiate policymaking in the hospital and community settings to develop public awareness programmes regarding the importance of iodine in women of reproductive age group. The maternity ward staff and community nurses should be knowledgeable and friendly, but strict. They should explain the young mothers and their family about the importance of iodine in fetal brain development. Community health nurses, both in rural and urban areas, are in the best position to spread awareness on the importance of iodine in fetal brain development. Therefore, they should find an opportunity to conduct educational programmes, which include preventive and promotive aspects. In educational programmes, the health personnel must necessarily include the family members for its success.

Public communication can play a very important role in disbursing information with simple messages in newspapers, pamphlets, and magazines both in English and local languages which will help in dispelling the myths and propagating the importance of iodine in fetal brain development. Nursing practice needs to be based on scientific knowledge. To thrive as a profession, nursing must not only keep pace with but set the pace for the future healthcare. The nurse can contribute to the profession to accumulate new knowledge regarding the importance of iodine in fetal brain development, testing of old knowledge and practice, and take professional accountability to educate and motivate women towards health-promoting practices. The present study would help nurses and other healthcare personnel to understand the level of knowledge of women regarding the importance of iodine in fetal brain development. Based on this knowledge nurse researchers can undertake similar studies among women

Conclusion

Despite growing concern regarding iodine status, the present study revealed a lack of knowledge about the importance of iodine in fetal brain development. In addition, we found a lack of knowledge about the most important dietary sources with which daily requirements of iodine can be achieved. Even though knowledge scores were not associated with participants' dietary status, it is likely that public education initiatives to improve the knowledge about iodine in this population groups will increase their awareness of the importance of iodine in fetal brain development. The different predictors of iodine knowledge found in this study may be used to target public education initiatives.

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