



The Perception of Pregnant Women Regarding Iodine Deficiency

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ABSTRACT

Background: Iodine is an essential trace element for normal growth and development of fetus body. Iodine deficiency disorder is one of the most important preventable micro nutrition deficiency problems globally. **Aim:** The aim of this study is to assess pregnant women's Knowledge and attitude regarding iodine deficiency. **Research design:** A descriptive study design was utilized. **Setting:** This study was conducted at the Antenatal care clinic of Fayoum general hospital. **Sample:** A Convenience sample was utilized to recruit 100 pregnant women. **Tools:** Three tools for data collection were used. **First tool:** A structured interviewing questionnaire to assess Socio demographic data, Medical, obstetric and menstrual ,current history. **Second tool:** Pregnant women's knowledge regarding Iodine deficiency. **Third tool:** Pregnant women's attitudes regarding Iodine deficiency. **Result:** The current study showed that less than three fifth of pregnant women having low level of knowledge regarding Iodine deficiency, while less than half of pregnant women had negative attitudes regarding Iodine deficiency during pregnancy **Conclusion:** the study pregnant women had unsatisfactory level of knowledge and negative attitudes regarding Iodine deficiency. **Recommendation:** Developing program to increase awareness regarding Iodine deficiency among pregnant women...

Keywords: Knowledge, Attitudes, Pregnant Women, Iodine deficiency.

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INTRODUCTION

Iodine is an essential mineral nutrient, mainly involved in thyroid metabolism. It is a key component of thyroid hormones (TH), which are essential for kidney, liver and brain metabolism. A healthy adult individual contains 15–20 mg of iodine, 70–80% of which is located in the thyroid gland. Iodine deficiency (ID) is frequent worldwide, affecting approximately 40% of the world's population, and around two third of European pregnant women are iodine deficient. Maternal thyroid metabolism can be heavily impaired during pregnancy because of ID, auto-immune disease or pregnancy-related changes. (Mégier *et al.*, 2023).

Pregnancy requires a healthy diet that includes an adequate supply of energy, protein, vitamins, and minerals to meet the increased needs of the mother and the fetus. Poor dietary intake of key micronutrients has been linked to compromised pregnancy outcomes and neonatal health and is a global public health concern. Although adequate food intake remains the preferred means for meeting dietary needs, some micronutrient requirements in pregnancy are difficult to meet with diet alone. In response, some countries have implemented programs for the fortification of selected foods and/or recommendations for the use of dietary supplements (Lopes *et al.*, 2022).

During pregnancy, the iodine intake must increase by 50% due to the needs of the maternal body to

synthesize more thyroid hormones, raised renal excretion due to increasing the rate of glomerular filtration, and enhanced fetal requirements from the second trimester. The US Institute of Medicine (IOM) and the World Health Organization (WHO) have recommended a daily intake of 220–250 mcg of iodine for pregnant women. According to most studies, the recommended method to determine iodine consumption is by measuring the urinary iodine concentration, with typical values ranging from 150–249 µg/L (Petca *et al.*, 2023)

Iodine deficiency It is especially important during pregnancy and infancy. If there is iodine deficiency in the mother, it can cause miscarriage, stillbirth, insufficient development of the fetus, increased infant mortality rate, neurological disorders and mental retardation in the baby. It can also lead to the development of goiter and hypothyroidism in the baby after birth. The most important cause of preventable mental retardation in the world is iodine deficiency (AYDIN *et al.*, 2023).

SIGNIFICANCE OF THE STUDY:

Iodine is one of the most common nutrient deficiencies and is estimated to affect 35–45% of the world's population. Iodine deficiency is the most common cause of goiter and worldwide is estimated to affect 2.2 billion people, however not all goiters are the result of an iodine deficiency. The incidence

of goiter is based on the degree of iodine deficiency. (*Hatch & Lieberman, 2022*).

Studies in European countries among pregnant women population group to determine ID by using Urinary Iodine Concentration (UIC) illustrated that, the prevalence of ID was in United States (44%), Canada (25.4%), Southwest England 27% and Czech republic).%(32).While it was found to be 57% among 191 pregnant women in Brazil so we need a study to assess pregnant women's Knowledge and attitude regarding iodine deficiency (*Knigh et al., 2017*).

In Egypt despite the implementation of a universal salt iodization program since 1996. and the demographic health survey (DHS), revealed that overall, 79% of Egyptian pregnant women were using adequately iodized salt. The prevalence of goiter is still high in Egypt (21.6 to 60.1%) and Eastern Mediterranean countries. In many developing countries including Egypt, despite the improvement of salt production and marketing technology, the quality of salt is still poor, incorrectly iodized or spoiled due to excessive exposure to moisture, light, heat, and contaminants (*Hassan et al., 2021*).

AIM OF THE STUDY

The aim of this study is to assess pregnant women's Knowledge and attitude regarding iodine deficiency. This aim will be achieved through the following objective:

1. Assess pregnant women's Knowledge regarding iodine deficiency.
2. Assess pregnant women's attitude regarding iodine deficiency.

RESEARCH QUESTION:

- 1- What is women's Knowledge regarding iodine deficiency during pregnancy ?
- 2-What is women's attitude regarding iodine deficiency during pregnancy?

SUBJECTS AND METHODS

Technical design:

The technical design included research design, setting, subject and tools for data collection.

Research Design:

A descriptive design was utilized for conducting this study.

Setting:

This study was conducted at the obstetrics and gynecological clinic(Antenatal care clinic) Fayoum General Hospital El-Fayoum Governorate that affiliated to the Ministry of Health and population(MOHP),which provide free services for all women.

Sample:

Type of the sample:

Convenience sample was used in this study.

Sample Size:

The sample size included 100 pregnant women attended to the Antenatal care clinics of Fayoum general hospital within Three months.

Tools for data collection:

Three tools it includes that developed after reviewing the related literature with considerations to the aim of objective and questions of the study.

Tool (I): A structured interviewing questionnaire:

A structured interviewing questionnaire; it was developed by the researcher in English and translated into simple Arabic languish form. It consisted of two parts.

Part (1): Socio Demographic Characteristics of the pregnant Women:

This part composed of (5) questions aimed to collect data related to age, residence, level of educations, Profession, and family income.

Part (2): Medical history (past, present, and family history).

This part composed of (5) questions aimed to collect data related to health history of the pregnant women suffer from any disease such as (Diabetes, kidney disease, heart disease, Hypertension).as well as Menstrual, and obstetrics history which composed of (9) questions aimed to collect data, such as(age of menarche, nature of menstruation, duration of menses, times of gravidity, parity,)

As regard to Current pregnancy History, There is (2) questions aimed to collect data such as (current gestational age ,pregnancy problem related to iodine deficiency).

Tool II: knowledge assessment sheet regarding iodine deficiency:

The tool devolved by researcher to assess pregnant women's knowledge regarding Iodine deficiency. Adaptive from (*Mahmoud et al., 2020*)

Knowledge scoring system

For knowledge score using (correct=2, incorrect=1, don't know=0)

Total Knowledge scoring system

The total score of knowledge was 29 point. Total Score of less than (<21) 70% was unsatisfactory and the score equal or more than (21-29) 70% was satisfactory

Tool III: pregnant women attitude regarding iodine deficiency:

Devolved and Translated in to Arabic by the researcher to assess the attitude of pregnant women, the questioner contain 9 questions covers various domains of life; Adapted from (*Wang et al., 2021*) .

Attitude Scoring system:

For attitude score using (Agree=3, Sometimes=2 and Disagree=1)

Total Attitude Scoring system:

The total score of attitude was 9 point. Score of less than (<20) 70% was negative and the score equal or more than (20- 27) 70% was positive

Validity:

Revision of the tools for clarity, relevance, comprehensiveness, understanding and applicability was done by panel of three expertise in maternal and

newborn health nursing department at Helwan University to measure the content validity of the tools and the necessary modifications were done accordingly.

Reliability:

Cronbach's Alpha was used to measure the internal consistency of the tools used in this study.

Alpha Cronbach Reliability Analysis of the Used Tool

| Items | Alpha Cronbach | F | P-value |
|-----------------|----------------|--------|---------|
| Total knowledge | 0.811 | 35.612 | <0.001* |
| Total attitude | 0.854 | 23.540 | <0.001* |

This table show Reliability in knowledge and attitude when Alpha Cronbach was >0.5.

The reliability was scaled as follows: <0-0.25 weak reliability, 0.25-0.75 moderate reliability, 0.75- <1strong reliability and 1 is optimum. The reliability for this questionnaire was 0.81.

Ethical considerations:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee Faculty of nursing Helwan University. The researcher clarified the aim of the study to the women included in the study to gain their confidence and trust. The researcher obtained informed consent from pregnant women. The researcher assured maintaining anonymity and confidentiality of subject's data. The women were informed that they are allowed to choose to participate or not in the study and that, they have the right to withdraw from the study at any time.

II- Operational item:**Preparatory phase:**

It includes reviewing of past, current, national and international related literature and theoretical knowledge of various aspect of the study using books, articles, internet and magazines to develop tools for data collection.

Pilot study:

The pilot study was carried on 10% (10) of pregnant women under study based on sample criteria, it has been conducted to test the applicability, clarity of questions and understand ability of the tool. Then the tool was modified according to the result of the pilot study. All Subjects who's shared on the pilot study were included in the sample.

Field work:

- Actual field work was carried out on the period from beginning Augusts 2022 up to end October 2022. Sample was collected during the period of working of the antenatal clinic 3 days weekly from 9 am to 1 pm.
- At the beginning, the women were interviewed in the waiting area of the obstetric antenatal clinic. Then the researcher introduced herself and explains the purpose of study to women to gain

their confidence and trust to participate in the study, and then the written consent was obtained from them.

- After that, the researcher started the assessment process individually. Then the researcher used tool (I) to assess women's socio demographic data, medical health history, past history, family history and, menstrual and obstetric history, current pregnancy history, according to interviewing questioner during pregnant women waiting area.
- After completing the questionnaire, the researcher provided health education with details for every pregnant women about knowledge regarding iodine deficiency including: (meaning of iodine, composition of iodine, Importance of iodine, Symptoms of iodine deficiency, Source of iodine in food, level of iodine in the body and in pregnant women, the way of the fetuses obtain iodine.....)
- After completing the questionnaire, the researcher provided health education with details for every pregnant women about positive attitude regarding ID, covers various domains of life;
- Finally, this interview took about 30-40 min for each woman; the woman was asked in Arabic language and documented her answer in the tools utilized and gives women chance to ask any question as needed.

III-Administrative design:

An official letter from the Dean of the Faculty of Nursing, Helwan University was directed to the administrators of El-Fayounm General Hospital to obtain an official approval to carry out the study after explanation of the aim of the study. This permission was obtained before the initiation of the data collection.

IV-Statistical design:

Statistical presentation and analysis of the present study was conducted, using the mean, standard deviation, **chi-square test** was used to compare

between groups in qualitative and **linear correlation coefficient** was used for detection of correlation between two quantitative variables in one group by

(IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.).

The significance level was determined as ($p < 0.05$).

RESULTS

Table (1): Distribution of the pregnant women according to their socio demographic characteristics n= (100)

| Socio demographic characteristics | N=100 | % |
|-----------------------------------|------------|-----------|
| Age | | |
| < 20 years old | 9 | 9 |
| 20 -25 years | 27 | 27 |
| 26-30 years | 41 | 41 |
| 31 -35 years old | 23 | 23 |
| Mean±SD | 28.45±4.67 | |
| Place of residence | | |
| Rural | 42 | 42 |
| Urban | 58 | 58 |
| Education level | | |
| Illiterate | 3 | 3 |
| Read and write | 9 | 9 |
| Basic | 9 | 9 |
| Secondary | 35 | 35 |
| University | 44 | 44 |
| Profession | | |
| Work | 52 | 52 |
| House wife | 48 | 48 |
| Monthly family income | | |
| Enough | 70 | 70 |
| Not enough | 30 | 30 |

Table (1) Showed socio demographic characteristics of studied pregnant women. There were (41%) of women aged (26-30) years .The same table clarified that the regarding of residence

(58%) of studied sample were from urban .As regard level of education (44%) were university. Regarding to the job (52%) was work. Regarding to monthly income (70%) has enough income.

Table (2): Distribution of the pregnant women according to their medical and family history n= (100)

| Medical and family history | N=100 | % |
|--|-----------|-----------|
| Suffer from any chronic disease | | |
| Yes | 23 | 23 |
| No | 77 | 77 |
| If the answer yes :(n=23) | | |
| Blood pressure | 10 | 10 |
| Diabetes | 11 | 11 |
| Others | 2 | 2 |
| Exposure to any surgeries | | |
| Yes | 45 | 45 |
| No | 55 | 55 |
| If the answer yes :(n=45) | | |
| Appendectomy | 37 | 37 |
| Cholecystectomy | 8 | 8 |
| Suffered from genetic diseases | | |

| | | |
|---|-----------|-------------|
| Yes | 56 | 56 |
| No | 44 | 44 |
| If the answer yes (n=56) | | |
| Diabetes | 30 | 30 |
| Blood pressure | 19 | 19 |
| Heart disease | 5 | 5 |
| Thyroid disease | 2 | 2 |
| member of the family suffer from any related diseases with iodine deficiency | | |
| Yes | 27 | 27 |
| No | 73 | 73 |
| If the answer yes : (n=27) | | |
| Thyroid tumor | 8 | 8 |
| Enlargement of thyroid gland | 11 | 11 |
| Hyperthyroidism | 6 | 6 |
| Other | 2 | 2 |
| Suffer from any medical problems related to iodine deficiency | | |
| Yes | 21 | 21 |
| No | 79 | 79 |
| If the answer yes : (n=21) | | |
| Thyroid tumor | 5 | 5 |
| Enlargement of the thyroid gland | 10 | 10 |
| Hypothyroidism | 4 | 4 |
| Hyperthyroidism | 2 | 2 |
| when you discover this disease | | |
| at the beginning of pregnancy | 6 | 28.6 |
| Six months age of pregnancy | 5 | 23.8 |
| One year age | 10 | 47.6 |

Table (2) Revealed that three quarter (77%) of the women's Not suffer from chronic disease, and more than one third (37%) of studied sample had done Appendectomy. According to women family history (44%) of pregnant women doesn't have any genetic diseases, While (30%) had diabetes, and

(73%) doesn't suffer from any related diseases with iodine deficiency, While (11%) had member of their family have Enlargement of thyroid gland. As well as (79%) of studied sample not suffer from any medical problem related to iodine deficiency.

Table (3): Distribution of the pregnant women according to their menstrual and obstetric History n= (100)

| Menstrual and obstetric History | N=100 | % |
|--|--------------|-----------|
| Age of menarche | | |
| <12 years old | 25 | 25 |
| 12-14 years old | 42 | 42 |
| >14 years old | 33 | 33 |
| Rhythm of the menstrual cycle | | |
| Regular | 70 | 70 |
| Irregular | 30 | 30 |
| Duration of monthly cycle | | |
| <five days | 52 | 52 |
| > five days | 48 | 48 |
| The number of pregnancies | | |
| 0 | 2 | 2 |
| 1 | 16 | 16 |
| 2 | 20 | 20 |
| 3 | 38 | 38 |
| 4 | 20 | 20 |
| 5 | 4 | 4 |
| Range | 0-5 | |
| Mean±SD | 2.7 | 1.14 |
| Number of previous births | | |

| Menstrual and obstetric History | N=100 | % |
|--|--------------|-----------|
| 0 | 18 | 18 |
| 1 | 18 | 18 |
| 2 | 38 | 38 |
| 3 | 22 | 22 |
| 4 | 2 | 2 |
| 5 | 2 | 2 |
| Range | 0-5 | |
| Mean±SD | 1.78 | 1.16 |
| Exposure to menstrual problems related to iodine deficiency | | |
| Yes | 28 | 28 |
| No | 72 | 72 |
| If the answer yes : (n=28) | | |
| Irregular menstruation | 10 | 10 |
| Menorrhagia | 16 | 16 |
| Menopause | 2 | 2 |
| Previous pregnancy problems related to iodine deficiency | | |
| Yes | 14 | 14 |
| No | 86 | 86 |
| If the answer yes : (n=14) | | |
| Early contraction | 6 | 6 |
| Eclampsia | 8 | 8 |
| Suffered from any problems in previous deliveries related to hypothyroidism | | |
| Yes | 16 | 16 |
| No | 84 | 84 |
| If the answer yes: (n=16) | | |
| Bleeding during or after childbirth | 6 | 6 |
| Premature detachment of the place | 6 | 6 |
| Premature birth | 4 | 4 |

Table (3) showed that (42%) had age of menarche (12-14)years old,(70%) of studied sample had regular menstrual period. Also (52%) of pregnant women duration of menses less than five

days,(38%) had two previous birth .(86%) no previous pregnancy problem related to iodine deficiency.

Table (4):Distribution of the women according to their Current pregnancy history n= (100)

| Current pregnancy history | N=100 | % |
|--|--------------|----------|
| The current gestational age(weeks) | | |
| 8 | 10 | 10 |
| 12 | 14 | 14 |
| 16 | 33 | 33 |
| 20 | 11 | 11 |
| 24 | 13 | 13 |
| 28 | 10 | 10 |
| 32 | 5 | 5 |
| 36 | 4 | 4 |
| Pregnancy problems related to iodine deficiency | | |
| Yes | 24 | 24 |
| No | 76 | 76 |
| If the answer yes : (n=24) | | |
| Threatening abortion | 16 | 16 |
| Gestational diabetes | 2 | 2 |
| Eclampsia | 4 | 4 |
| Other | 2 | 2 |

Table (4) According to the women Current history (33%) of studied sample in 16 weeks of current gestational age, and (76%) had not pregnancy problem related to iodine deficiency.

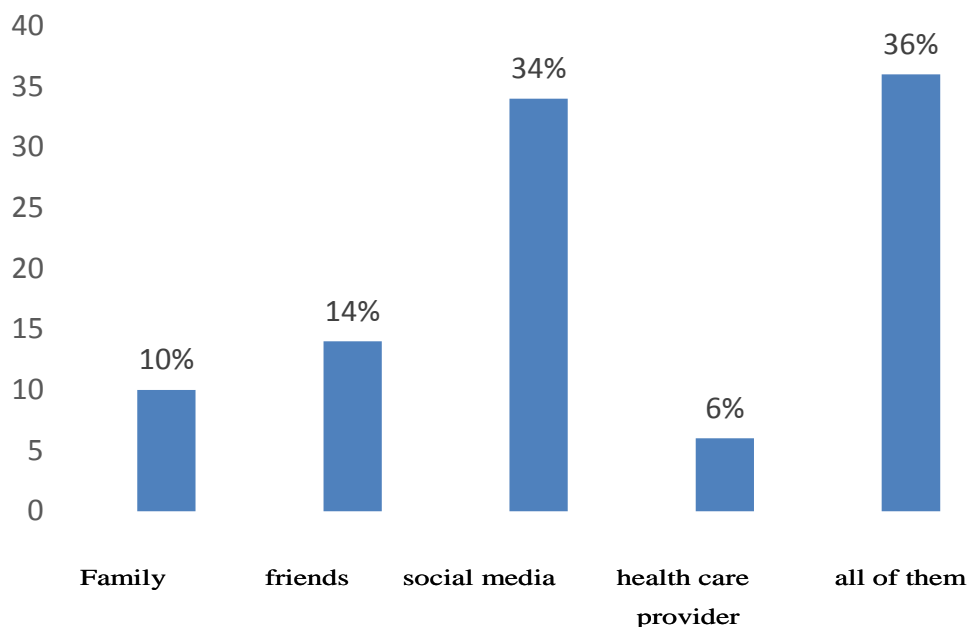
Figure (1) Distribution of the women according to their Source of information on iodine

Figure (1) displayed that according to the women Source of information about iodine (34%) of studied sample had source of information from social media, and (14%) had source of information

from friends, and (10%) of pregnant women had source of information from their family,(6%)had source of information from health care provider.

Table (5): Distribution of the pregnant women according to their knowledge regarding iodine deficiency n=(100)

| Knowledge of the pregnant women regarding iodine deficiency | Correct | | Incorrect | | Don't know | |
|--|---------|----|-----------|----|------------|----|
| | N | % | N | % | N | % |
| Definition of iodine | 23 | 23 | 54 | 54 | 23 | 23 |
| Composition of the iodine element | 34 | 34 | 42 | 42 | 24 | 24 |
| Source of iodine in food | 28 | 28 | 46 | 46 | 26 | 26 |
| Normal level of iodine in the human body | 26 | 26 | 51 | 51 | 23 | 23 |
| Symptoms of iodine deficiency | 36 | 36 | 45 | 45 | 19 | 19 |
| Knowing iodized salt | 41 | 41 | 39 | 39 | 20 | 20 |
| Iodized salt treats | 16 | 16 | 63 | 63 | 21 | 21 |
| Iodine is expensive | 46 | 46 | 30 | 30 | 24 | 24 |
| The most causes of iodine deficiency disease | 23 | 23 | 59 | 59 | 18 | 18 |
| Groups is most at risk of developing iodine deficiency disease | 22 | 22 | 63 | 63 | 15 | 15 |
| Correct timing for taking a heel sample | 27 | 27 | 38 | 38 | 35 | 35 |
| Importance of the iodine during pregnancy | 25 | 25 | 50 | 50 | 25 | 25 |
| Normal level of iodine for a pregnant woman | 23 | 23 | 59 | 59 | 18 | 18 |
| the way of the fetus obtain the iodine | 18 | 18 | 55 | 55 | 27 | 27 |
| Iodine deficiency cause mental retardation in fetuses | 34 | 34 | 39 | 39 | 27 | 27 |

| | | | | | | |
|---|----|----|----|----|----|----|
| Iodine deficiency impede the child's physical development (short stature) | 38 | 38 | 36 | 36 | 26 | 26 |
| Iodine deficiency negatively effect on the pregnant woman | 24 | 24 | 45 | 45 | 31 | 31 |
| If the answer is yes, what is it | 21 | 21 | 49 | 49 | 30 | 30 |
| Problems resulting from insufficient amounts of iodine during pregnancy for the fetus | 31 | 31 | 43 | 43 | 26 | 26 |
| Possible complications during pregnancy for the fetus | 42 | 42 | 32 | 32 | 26 | 26 |
| Possible complications during childbirth | 32 | 32 | 54 | 54 | 14 | 14 |
| Possible complications after childbirth | 40 | 40 | 35 | 35 | 25 | 25 |

Table (5) Show the women according to their knowledge regarding iodine deficiency, There were (41%) of studied sample had correct answer regarding knowing iodized salt, and (24%) had correct answer regarding iodine deficiency negatively effect on the pregnant woman, and (46%) of pregnant women had correct answer regarding Iodine is expensive,. While the half of pregnant women(54%,46%,59%,55%)had incorrect

answer regarding to definition of iodine , regarding source of iodine in food, regarding normal level of iodine for pregnant women, regarding the way of the fetus obtains the iodine respectively. As (31%) of studied sample had don't know answer regarding negatively effect on pregnant women,(26%) had don't know answer regarding problem resulting from insufficient amount of iodine during pregnancy for the fetus.

Figure (2) Distribution of the total knowledge score of the sample about iodine deficiency (N=100)

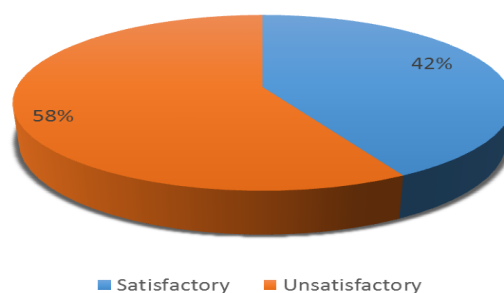


Figure (2) Represent that (42%) of the women had Satisfactory level of total knowledge regarding iodine deficiency, While (58%) of the women had

UN Satisfactory level of total knowledge regarding iodine deficiency

Table (6): Distribution of the pregnant women attitude regarding iodine deficiency n= (100)

| Attitude regarding iodine deficiency | Agree | | Some times | | Disagree | |
|--|-------|-----------|------------|-----------|----------|-----------|
| | N | % | N | % | N | % |
| A pregnant woman does a thyroid test at the beginning of Pregnancy. | 69 | 69 | 24 | 24 | 7 | 7 |
| Taking iodine –containing medicine during pregnancy. | 22 | 22 | 41 | 41 | 37 | 37 |
| A pregnant women use iodine reach tablet salt. | 35 | 35 | 33 | 33 | 32 | 32 |
| Thinking that a pregnant woman eats food rich with iodine during pregnancy. | 46 | 46 | 37 | 37 | 17 | 17 |
| A pregnant woman distinguishes the taste of iodine rich salt from other type of salt. | 14 | 14 | 46 | 46 | 40 | 40 |
| Thinking that a pregnant women takes iodine rich salt in all meal during her day. | 26 | 26 | 26 | 26 | 48 | 48 |
| A pregnant woman does continuous tests to monitor the iodine level in the body during pregnancy. | 49 | 49 | 30 | 30 | 21 | 21 |
| A pregnant woman takes iodine containing medicine before pregnancy. | 31 | 31 | 34 | 34 | 35 | 35 |
| Important during pregnancy to eat a certain foods containing iodine. | 70 | 70 | 22 | 22 | 8 | 8 |

Table (6) Shows pregnant women attitude regarding iodine deficiency, there were (69%) of studied sample had agree regarding a pregnant women do a thyroid test at the beginning of pregnancy, while (70%) of them had agree regarding important during pregnancy to eat a certain foods containing iodine. While (41%) had some times regarding Taking iodine –containing medicine during pregnancy, and (46%) of studied

sample had some times regarding a pregnant women distinguish the taste of iodine rich salt from other type of salt, while (17%) had disagree regarding Thinking that a pregnant women eat food rich with iodine during pregnancy, while (48%) of studied sample had disagree regarding Thinking that a pregnant women takes iodine rich salt in all meal during the day.

Figure (3) Distribution of the pregnant women total attitude regarding iodine deficiency n = (100)

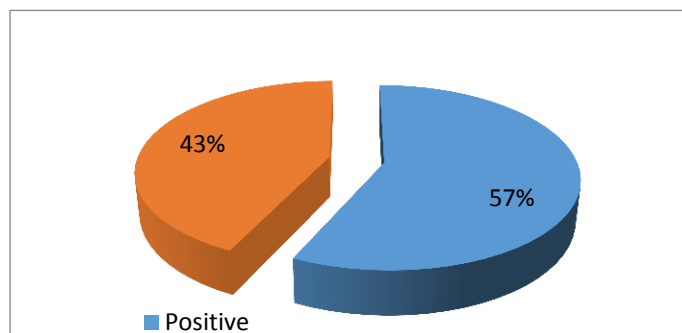


Figure (3) Represent that (57%) of women had positive attitude regarding iodine deficiency, While (43%) of studied sample had negative attitude from total attitude.

Table (7): Correlation between Total knowledge score and Total attitude score

| | Total knowledge score | |
|----------------------|-----------------------|---------|
| | R | P-value |
| Total attitude score | 0.311 | 0.002* |

Table (7) Shows there was statistically significant between total knowledge score and total attitude score when p-value <0.05*.

DISCUSSION

The present study that aimed to assess pregnant woman's awareness regarding iodine deficiency during pregnancy at Fayoum general hospital regarding to the demographic characteristics of the study sample, the current study revealed that more than two fifth of the study sample aged between (26 to30) years .from researcher point of view it the best age for fertility and pregnancy.

These findings agree with *Margawati, et al (2022)*, who conducted a study in Indonesia on "Risk factors for disorders due to iodine deficiency (IDD) among pregnant women " and found that the majority of the study sample 79% had from 20 to35 years old

These findings disagree with *Kaile et al (2020)*. Who conducted a study in Zambia: on "Prevalence of iodine deficiency among pregnant women in Gwembe and Sinazongwe districts" and

found that the majority of the study sample had from 26 to30 years old

In relation to their residence this study finding can clarify the fact that more than half of them was from urban. This could be explained by the presence of patients come from adjacent urban areas, while mothers living in other places could receive antenatal care from health centers close to their residence. This highlights the importance of educating mothers in rural and urban areas.

These findings agree with *Azzeh & Refaat (2020)*: Who conducted a study in Saudi Arabia, on "Iodine adequacy in reproductive age and pregnant women living in the Western region of Saudi Arabia, and found that the majority (87%) was from urban

These findings disagree with *Hassan et al (2022)*. Who conducted a study in Egypt on "Knowledge and practice of pregnant women regarding prevention of iodine deficiency during pregnancy" and found that less than two thirds of the studied pregnant women were from rural area.

Also these findings disagree with *Hassan et al, (2021)*. Who conducted a study in Egypt, on Iodized salt, knowledge versus practice among females in Fayum governorate, and found that the (63.6%) was from rural

In relation to their education this study finding can clarify the fact that more than two fifth of pregnant women were university and more than third of them were secondary educated. This might be due to more than half of pregnant women were from urban area and this result may be reflect the educational background of in Egypt population especially urban area where many of student females in need to complete their study to find good job. These findings agree with *Margawati, et al (2022)*: who found that the study sample 47% had sufficient education

These findings disagree with *Sarika, (2022)*: Who conducted a study in India on "Assessment of iodine deficiency disorders among pregnant women residing in an urban slum of west Delhi" who found that the majority of study sample 59% Illiterate

According to the current study findings regarding to the pregnant woman occupation, more than half were employee this might be due to the most of pregnant women were well educated, and their need to improve standard of living. , also the possible reason may be related with the woman have good opportunity to get a job in our society.

This finding was in the same line with *Aakre et al., (2019)*, who conducted a study in United States, on "Associations between thyroid dysfunction and developmental status in children with excessive iodine status". They found that (76.7%) of pregnant women were employee. These findings disagree with *Sarika, (2022)*: who found that the majority of study sample "93.3 were house wife.

According to the current study findings regarding to their monthly income nearly three quarter has enough income. This might be due to that more than half of pregnant women were employee. These findings agree with European study conducted by *Dineva, et al.(2023)*; Exploration of thyroglobulin as a biomarker of iodine status in iodine-sufficient and mildly iodine-deficient pregnant women who found that (57.9%) has enough income.

Regarding to medical and obstetric history, the results of the present study revealed that the majority of the studied sample neither had medical problems nor obstetric problems in their current pregnancy, and about three quarter not suffer from chronic disease, and two fifth of them have two previous labors and all the studied sample were in the first trimester, also the majority of them don't take any drugs for treatment of iodine deficiency disorders.

These findings agree with *Mahmoud, et al. (2020)*. Who conducted a study in Egypt on "awareness of pregnant women regarding iodine deficiency" and found that majority of the studied sample didn't have any current medical problems

Also it came along with *Sangsefidi, et al., (2020)* who conducted a study in Esfarayen and Jajrom Cities about "pregnant women's iodine status and their knowledge, attitude, and practice towards iodized salt." journal of nutrition and food security "and found that pregnant women in the first trimester and they didn't use any anti-thyroid drugs.

According to the current study findings less than three quarter of pregnant women had not any menstrual problems related to iodine deficiency, conducted by *Bouga, & Combet (2018)* who conducted a study, in London on "contemporary challenges to iodine status and nutrition: the role of foods, dietary recommendations, fortification and supplementation" and found that the majority of study sample had not any menstrual problems related to iodine deficiency

According to the women Source of information about iodine more than one third didn't hear about iodine or didn't have previous knowledge about iodine. From the researcher point of view, this may be due to, their family and friends don't have enough knowledge about iodine deficiency to provide the pregnant women with suitable information and the pregnant women don't have enough experience on internet to get correct information about iodine deficiency, also they aren't following the medical provider regularly to get the best information about iodine deficiency so the researcher advice to arrange more scientific information through health care services, TV and social media to improve their knowledge

This is similar to a study conducted in Debreberhan by *Tegegne. (2019)* in a study entitled "assessment of knowledge and practice of iodized salt utilization and associated factors among pregnant women in debreberhan town" which revealed that 66.8% of the studied women receive information about iodine deficiency from media (TV, radio), nearly one fifth from friends, family, and neighbors, and nearly two fifth from printed material (newspaper, brusher, and leaflet).

In the same line these findings agree with *Al Hadid, & Al Barmawi (2019)* in Jordan "about "the relationship between iodine nutrition, thyroid function, and obstetrical outcomes for Jordanian pregnant women" who found that the majority of the study sample had no source of information and the few of them had information from nursing students, internet and mass media, books and magazines, friends and family.

These findings disagree with *Mahmoud, et al. (2020)*. Who conducted a study in Egypt on

"awareness of pregnant women regarding iodine deficiency" and found that regarding source of knowledge about iodine, the present study revealed that the majority of the studied sample (78.1%) didn't hear about iodine or didn't have previous knowledge about iodine

Pregnant woman's total level of knowledge regarding iodine deficiency

Among the most challenging issues concerning iodine deficiency, is the knowledge of the women about the key role of iodine for their health and the fetus development, according to the current study regarding to total knowledge of pregnant women about iodine deficiency, found that more than two fifth of the women had satisfactory level of total knowledge regarding iodine deficiency, While less than three fifth of the women had un satisfactory level of total knowledge regarding iodine deficiency.

This may be due to lack of mothers' knowledge and health awareness regarding iodine deficiency and prevention so mother education about iodine deficiency, and increasing the number of educated individuals, will significantly decrease the number of iodine deficiency cases, This will lead to a significant decrease of morbidity and mortality rates.

This results in harmony with *Abu-Baker et al. (2021)* in a quasi-experimental study; entitled "The Effect of Health Education on Dietary Knowledge and Practices of Pregnant Women in Jordan", proved that after health education, the intervention group recorded significantly higher dietary knowledge score (mean= 19.30, SD= 0.88) compared to the control group score (mean= 14.36, SD= 2.11), $p < 0.001$.

Also these findings agree with *Mahmoud, et al. (2020)*. Who found that quarter of the pregnant women have satisfactory knowledge and 75% of them had unsatisfactory knowledge about iodine deficiency during pregnancy

On the other hand, contradictory finding proved by *Almuzaini et al. (2019)* in a study entitled "Assessment of knowledge and awareness regarding thyroid disorders among Saudi people demonstrated that 57.32% of respondents had good knowledge, whereas 42.68% had poor knowledge of thyroid disorder diseases.

Total attitude of pregnant women toward iodine deficiency

According to the current study findings regarding total attitude of pregnant women toward iodine deficiency more than half of pregnant women had positive attitude regarding iodine deficiency, while less than half of them had negative attitude from total attitude

While our study finding disagreement with study done in Iran, by *Sangsefidi, et al (2020)* "Pregnant women's iodine status and their

knowledge, attitude, and practice towards iodized salt" they found about (72.0%) had a positive Attitude towards Iodized Salt.

Correlation between Total knowledge and Total attitude

According to the current study there was statistically significant between total knowledge score and total attitude score the researcher normalizes her study findings to the poor knowledge of the study women which directly reflect on their attitude

Which supported by *Tegegne (2019)* reported that the mother who had good knowledge on iodine and iodizes salt utilization had 6 times more likely had good practice on iodine utilization.

CONCLUSION

In the light of the current study, it can be concluded that:

the study pregnant women had unsatisfactory level of knowledge and negative attitudes regarding Iodine deficiency.

RECOMMENDATIONS

Based on the results of the present study, the following recommendations are suggested:

- Periodic evaluation of pregnant women's knowledge and attitudes regarding Iodine deficiency during pregnancy.
- Raising awareness of pregnant women regarding Iodine deficiency.
- Learning resources such as electronic resources such as computers and internet should be made accessible in the Antenatal clinical. **Recommendations for further researches:**
- The study should be replicated on large sample and in different hospitals setting in order to generalize the results.
 - Further study to evaluate the reflection of educational program regarding pregnant women perception

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