

Effect of Social-Platform Educational Program on Primigravida Women's Knowledge regarding Vitamin D Deficiency during Pregnancy

Howaida Amin Hassan Fahmy Elsaba ⁽¹⁾, Rania Mohamed Gad El-Bastwese ⁽²⁾, Mona Mohamed Abd ElHamid Younes ⁽³⁾, Tereza Khalifa Garas Girgis ⁽⁴⁾, Hala Ahmed Thabet ⁽⁵⁾

(1) Maternity, Obstetric, and Gynecological Nursing Department, Faculty of Nursing, Port Said University, Egypt

(2) Lecturer of Community Health Nursing, Faculty of Nursing, Mansoura University, Egypt

(3) Lecturer of Community Health Nursing, Faculty of Nursing, Port Said University, Egypt

(4) Maternal and Newborn Health Nursing, Faculty of Nursing / October 6 University, Egypt

(5) Women's Health and Midwifery Nursing Department, Faculty of Nursing, Mansoura University, Egypt

Abstract

Background: Pregnant women have a high prevalence of vitamin D insufficiency has detrimental effects on fetal and maternal complications. **Aim:** This study aimed to assess the effectiveness of applying for a social-platform educational program on primigravida women's knowledge regarding vitamin D deficiency during pregnancy. **Subjects and method: Design:** Quasi-experimental research design (pre and post-test) was utilized. **Setting:** The study was conducted at the Maternal and Child Health Center at Talkha City and Elsalakawy Maternal and Child Health Center at Mansoura City belonging to Dakhahlia Governorate, Egypt. **Subjects:** A convenience sample of (300) primigravida women were enrolled. **Tool for data collection:** Tool: Online-administered questionnaire, it covered four parts personal data, current obstetric history, primigravida women's knowledge about vitamin D deficiency, and women's opinion about a social-platform educational program. **Results:** There were highly statistically significant differences between primigravida women's knowledge pre-and post-social-platform educational program implementation at p-values=< 0.001. The results also, revealed that all of the studied primigravida women reported that the contents were enough and were satisfied with the social-platform educational program. **Conclusion:** The present study concluded that utilizing social-platform educational program implementation was effective in improving primigravida women's knowledge regarding vitamin D deficiency during pregnancy. **Recommendations:** The provision of continuing education programs in a different setting is recommended to increase primigravida women's knowledge about the importance of adequate intake of vitamin D to improve pregnancy outcomes.

Keywords: Pregnancy, Primigravida women's knowledge, Social-platform educational program, Vitamin D deficiency.

Introduction

Fat-soluble vitamin D is known as the "sunshine vitamin". When sunlight's UV rays strike the skin, it develops. One billion people are thought to be vitamin D deficient or insufficient worldwide, making vitamin D insufficiency a widespread nutritional problem with epidemic proportions. (Manandhar et al, 2020). Only a very tiny number of foods contain it naturally; it is available as a dietary supplement. When sunlight's UV radiation hits the skin, vitamin D is produced (National Institutes of Health, 2020).

It can be found in a variety of foods, including fatty fish (salmon, tuna, and mackerel), cheese, egg yolk, and cow liver (Elsobkey and Amer, 2019). Numerous

factors, such as a growing indoor lifestyle that limits exposure to sunlight, might result in vitamin D deficiency. It can be found in several foods, such as cheese, egg yolks, fatty fish (such as salmon, tuna, and mackerel), and cow liver. Vitamin D deficiency may be caused by a variety of circumstances, including a rising indoor lifestyle that reduces exposure to sunlight. Low dietary intake is the result of changing eating habits. High-fiber diets contain phytates and phosphates, which can reduce vitamin D reserves and raise calcium requirements. Unplanned and closely spaced pregnancies in women with dietary inadequacies may have an impact on the mother's and fetus' vitamin D levels. (Hashem et al, 2020; Aghaei et al, 2021 & Mortensen et al, 2022).

Up to 40% of pregnant mothers have been shown to suffer from vitamin D deficiency, and it is highly prevalent and severe during lactation even in sun-rich areas (**Fogacci et al., 2019**). Low maternal vitamin D levels have led to slowed fetal and childhood growth in addition to a two-fold increased risk of congenital heart problems in kids, perinatal depression in mothers, bacterial vaginosis, a higher rate of fetal miscarriage, gestational diabetes, and. Rates of vitamin D insufficiency and shortage during pregnancy range from 96.0% to 99.4%, making them quite prevalent. (**Siddique et al., 2022**).

The regulation of calcium and phosphate balance by vitamin D, which has a considerable effect on bone metabolism, is well established (**WHO, 2019**). Vitamin D is referred to as the "sunshine vitamin" because it is produced by the skin in reaction to sunlight. The fat-soluble vitamins D-1, D-2, and D-3 are its family members. When exposed to sunlight, the skin produces vitamin D on its own. Additionally, to obtain ideal blood levels of the vitamin, eat it through particular foods and supplements (**Debra, 2020**). There are two main kinds of vitamin D: vitamin D3 (cholecalciferol), which is created in huge amounts in the skin when sunlight strikes bare skin, and vitamin D2 (ergocalciferol), which is produced by plants but not by humans. Animal sources can also provide it for consumption (**Siemens, 2019**).

Vitamin D helps the body more easily absorb calcium, one of the primary components of bones. Too low a vitamin D intake can lead to the disorders of rickets and osteomalacia, which are both characterized by brittle, thin, and soft bones in children and adults, respectively. The immune system, muscles, and nerves all depend on vitamin D to send and receive signals to and from the brain and other regions of the body. In addition, vitamin D protects the elderly from developing osteoporosis. Up to 40% of pregnant women may experience vitamin D deficiency, and it is especially prevalent and severe during lactation, according to the **National Institutes of Health (2020)**.

In addition to impairing fetal and childhood growth, maternal vitamin D deficiency has been Other adverse pregnancy outcomes

including type 1 diabetes, eczema, and inflammatory and atopic disorders in the offspring (**Fogacci et al., 2019**). With rates ranging from 96.0 percent to 99.4 percent, vitamin D deficiency and insufficiency are exceedingly prevalent during pregnancy. Pregnancy outcomes that are connected to vitamin D deficiency in pregnant women include preeclampsia, gestational diabetes, cesarean sections, and infectious diseases. Type 1 diabetes, eczema, and inflammatory and atopic problems in kids are additional unfavorable pregnancy outcomes (**Hong-Bi, 2018**).

Beyond its traditional roles in bone and calcium homeostasis, vitamin D's pluripotent regulator of biological functions is increasingly being recognized. Even in sun-rich areas, pregnant women have a high rate of vitamin D deficiency. Several studies found a link between maternal vitamin D deficiency and adverse maternal and fetal outcomes like gestational diabetes, preeclampsia, preterm labor, low birth weight, and cesarean section (Ates et al., 2016).

One of the most recent approaches to education is electronic education. It delivers educational content by combining various technologies and equipment. Electronic media, complex networks like the internet and extranet, compact discs, multimedia software, and computer simulation modeling are among these equipment and technologies. Social-platform education is an extension of electronic education that combines multiple media to make it easier for students and software to interact. This encourages creativity and makes education more effective (**Mortensen et al., 2022**).

Social media is increasingly being used in healthcare to speed up communication, convey correct information, and spread awareness about support, therapies, and self-care alternatives (**Cheraket al., 2020**). Helping people acquire greater levels of knowledge and competence is the main goal of social-platform education. One benefit of social-platform education is how simple it is for persons with little literacy abilities to use it. Studies on patient preparation for radiotherapy, lumbar disc surgery, and other treatments, as well as

the use of social media platforms for patient education. For various user kinds, demographics, and age groups, social media serves several purposes. Due to the relationship between technical advancement and trends in linguistic and cultural change, the purpose of social media is always changing (Statsita, 2019).

Obstetric and community health nurses play a significant role in the prevention of vitamin D deficiency as numerous readings from different parts of the world show that knowledge, attitude, and behavior play an essential role in influencing the major risk factors leading to vitamin D deficiency or inadequacy. Through health education, nurses can take urgent steps to create awareness about vitamin D deficiency and instruct mothers about sources of vitamin D and the importance of sun exposure because it is not possible to obtain a sufficient amount of vitamin D from dietary sources only (Kamel et al, 2017 & AlFaris et al, 2019).

Significance of the study

According to Massoud (2018), there was a significant relationship between the mother's serum vitamin D status and that of her newborn in Egypt, where there was a high prevalence of vitamin D deficiency among pregnant women and their newborns in the first week of life (47 to 86 percent). Vitamin D deficiency accounted for 72.6% of the lactating group, 54% of the pregnant group, and 72% of the childbearing age group in Egypt, according to a study on the vitamin D status of Egyptian females (Raif et al., 2015). WhatsApp reminder messages are one effective method for obtaining continuing education. It may assist in acquiring knowledge and skills. Because WhatsApp reminder messages rely on them remembering and repeating messages through images, videos, and power points to improve and expand on their knowledge, and practice. **Hence, the study aimed to** determine the effect of social-platform educational program on primigravida women's knowledge regarding vitamin D deficiency during pregnancy

Aim of the study

This study aimed to assess the effectiveness of applying for a social-platform educational program on primigravida women's knowledge

regarding vitamin D deficiency during pregnancy through:

- 1) Determine primigravida women's knowledge level regarding vitamin D deficiency during pregnancy
- 2) Develop and apply social-platform educational program regarding vitamin D deficiency according to their needs.
- 3) Evaluate the women's opinion about a social-platform educational program.

Research hypothesis:

Application of the Social-platform educational program will improve the primigravida women's knowledge level regarding vitamin D deficiency during pregnancy.

Subjects and methods

Research design:

Quasi-experimental research design (pre and post-test) was utilized in this study to achieve the aim of this study.

Setting:

The study was conducted at the Maternal and Child Health Center at Talkha City and Elsalakawy Maternal and Child Health Center at Mansoura City belonging to Dakhahlia Governorate, Egypt.

Subjects:

A convenience sample of (300) primigravida women was enrolled. The subjects at first were determined through inclusion criteria in the previously mentioned setting and invited to participate in an online electronic questionnaire using a Google forms spreadsheet which was presented in Facebook and Whats App groups. All the studied Primigravida women meet the following inclusion criteria: educated or at least read and write, aged from 18 to 45 years old, between 20 and 36 weeks of gestation, accessible via phone call, already use social platforms such as Facebook and WhatsApp groups, free from mental, chronic disease, and agree to participate in this study.

Tools of data collection:

One tool was used for data collection for the study as follows:

The online-administered questionnaire was developed by the researchers after reviewing the related literature and research studies (Hong et al., 2018; Anishlyn et al., 2018; Alamoudi et al., 2019; Abdel Nabi et al., 2020; Soliman et al., 2020; Manandhar et al., 2020; National Institutes of Health, 2020; & Mortensen et al., 2022). This tool was an online Google form that was sent to the respondents' primigravida women via Facebook and WhatsApp groups. It included four parts:

Part (1): to assess the personal data of the primigravida women; which included age, marital status, level of education, occupation, phone number, and residence.

Part (2): to assess the current obstetric history of the primigravida women; which included gestational age, antenatal care follow-up, and current pregnancy complications.

Part (3): Primigravida women's knowledge about vitamin Deficiency: this part was classified into(2) main categories, that covered multi-choice questions related to knowledge which included: first category knowledge about vitamin D such as definition, sources, normal level, benefits of Vitamin D, the best time and body parts exposed to the sun. Also, the second category is knowledge about vitamin D deficiency such as its definition, causes, signs, and symptoms, its negative effect on pregnant woman's health & pregnancy outcomes, and prevention and treatment of vitamin D deficiency.

Knowledge scoring system:

Scores were estimated to assess the knowledge. One mark was assigned to a correct answer; while a value of zero was given for incorrect answers or un-know the answer. The total score ranged from 0 to 30. The mean and SD were used to determine the difference in knowledge scores The level of the primigravida women's knowledge was considered unsatisfactory when the score was less than 70%, while $\geq 70\%$, the primigravida women's

level of knowledge was considered a satisfactory level.

Part (4): Primigravida women's opinions a social-platform educational program

It is used to assess primigravida women's opinions about the social-platform educational program, which includes importance, content, time, media, and satisfaction.

Validity and reliability of the tool:

Face Validity was tested by five experts from Community Health Nursing and Obstetric Nursing Departments. . Modifications were made according to the panel judgment to ensure clarity, content appropriateness, relevance, and comprehensiveness. Reliability: The reliability was done by calculating Cronbach's Alpha which was 0.89.

The procedure of data collection:**Ethical considerations and Administrative design:**

According to the Ethical Review Committee in the Faculty of Nursing at Mansoura University, all research-related ethical concerns were addressed to carry out this study. An informed consent form was included on the online questionnaire's first page. The quick response (QR) code and link to the online questionnaire were on the cover page of the questionnaire, along with a brief explanation of the study's goals. Primigravida women completed the questionnaire after reading the consent form. They were informed that their participation in the study was entirely up to them and that they could cancel at any time with no explanation. The participants were informed that the information they provided would only be used for research.

Pilot Study:

A pilot study was carried out on 10% of the primigravida women (30 primigravida women) to test the clarity and testing of the feasibility, simplicity, and applicability of the research process as well as to determine the time allowed to fulfill the developed tool. Those primigravida women who were involved in the pilot study were included in the study.

Fieldwork:

The study was carried out from the first of May 2021 to the end of October 2021.

The current study was carried out in three phases; preparatory, implementation, and evaluation phases.

The collection of data was done through three phases:

- **I-Preparatory phase:** The researchers reviewed the current and past available literatures, textbooks, articles, magazines, and internet searches to develop the tools for data collection. Primigravida women were given information about the study's purpose and anticipated outcomes, the contents of the tools, and how to respond on the first page of the online questionnaire. Participants were invited to complete and submit an online Google Form after ensuring the availability of internet access to ensure materials were accessible to pregnant women. Primigravida women received the link to the Google form through Facebook and WhatsApp applications. Based on their level of knowledge, the educational booklet's content was written in Arabic language and was consistent with relevant literature.

II- Implementation phase:

- The researchers set up a WhatsApp group to communicate with primigravida women through the online social platform to share information about the educational program. The researchers divided the participants into 5 subgroups and met the studied primigravida women online through Zoom meetings link once or twice weekly. Primigravida women were also told to show up to the Zoom meeting on time so that everyone in the group could talk freely. Three sessions were attended by Primigravida women. The duration of each session was about an hour.

The first session covered knowledge content about what is vitamin D, the normal level of vitamin D, sources of vitamin D, benefits, best time and body parts to be exposed to the sun

The second session concentrated on the effect of vitamin D deficiency on pregnancy outcomes, its effect on pregnant women's health, signs and symptoms, causes and effects on pregnancy outcomes, and women's health.

The third session covered knowledge content about the treatment of vitamin D deficiency and prevention of vitamin D deficiency

A soft copy of the booklet was distributed through the Facebook and WhatsApp groups of those who took part in the pre-test via the Google Form. To clarify it for primigravida women, the researchers posted appropriate PowerPoint presentations, videos, and posters regarding vitamin D and its deficiency to improve primigravida women's knowledge.

III - (Evaluation phase):

The evaluation was done post-social-platform educational program implementation by using the same questionnaire; the questionnaire was re-posted to the participants on the Google Form for collection (post-test) and evaluated again.

Statistical design:

The data were tabulated and analyzed using SPSS V.20. The data were tested for normality using the Anderson-Darling test and for homogeneity variances before further statistical analysis. Descriptive data were analyzed by calculation of mean value and SD for quantitative data, whereas frequency and percentage were used for qualitative data, which were analyzed using the Chi-square test used to compare qualitative variables. T-test was used for comparison between 2 paired within one group. Significance : $p < 0.05$ was considered statistically significant. Highly Significance: ; $p < 0.001$

Results

Table (1): Shows that 66 %of the participating primigravida women were aged 18 <25years, 90% were married, 62% were from rural areas, and 44% were read and write. Also, it was observed that 94% of them were not working.

Figure (1): Illustrates that the main source of the studied primigravida women's

knowledge regarding vitamin D deficiency was doctors (60%).

Table (2): Shows that more than half of the studied primigravida women (55%) were in the third trimester, the majority (81.7%) attained regular antenatal care and 19% were anemic

Figure (2): Demonstrates that (10%) of the studied primigravida women had satisfactory knowledge regarding Vitamin D deficiency in pre compared to 87% of them had satisfactory knowledge in post-social-platform educational program intervention with a significant difference.

Table (3): Presents that there was a highly statistically significant difference detected between primigravida women's correct

knowledge pre/post- social-platform educational program intervention at ($P < 0.001$).

Table (4): Presents that there was a highly statistically significant difference detected between primigravida women's mean **knowledge** score pre/post- social-platform educational program intervention at ($P < 0.001$).

Table (5): Presents that all of the studied primigravida women (100%) reported that the contents were enough, the media was clear, and were satisfied with the social-platform educational program. Also, the topic was important for (96.7%) of the studied primigravida women and the time was enough for (96.3%) of the studied primigravida women.

Table (1): Distribution of studied primigravida women according to their data (n=300)

Personal data	n. (300)	%
Age/years:		
• 18<25	198	66.0
• 25<30	49	16.3
• 30<35	33	11.0
• ≥ 35	20	6.7
Mean age 28.3±4.47		
Marital status		
• Married	270	90.0
• Divorced	20	6.7
• Widow	10	3.3
Residence:		
• Urban	114	38.0
• Rural	186	62.0
Educational level:		
• Read and write	132	44.0
• Basic education	60	20.0
• Secondary education	90	30.0
• University education	18	6.0
Occupation		
• Working	18	6.0
• Not-working	282	94.0

Table (2): Distribution of studied primigravida women according to their current obstetrical history: (n=300).

Item	n. (300)	%
Gestational age		
• Second trimester	135	45.0
• Third trimester	165	55.0
Antenatal care follow up		
• Regular	245	81.7
• Irregular	55	18.3
Current pregnancy complications		
• None	210	70.0
• Preeclampsia	6	2.0
• Gestational diabetes	3	3.0
• Genital infection	18	6.0
• Anemia	57	19.0

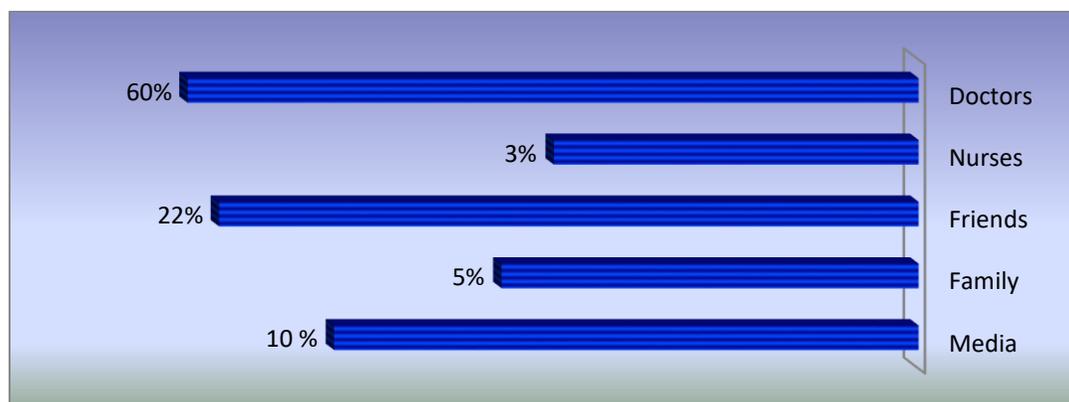


Figure (1): Distribution of the studied primigravida women regarding their sources of knowledge about vitamin D deficiency

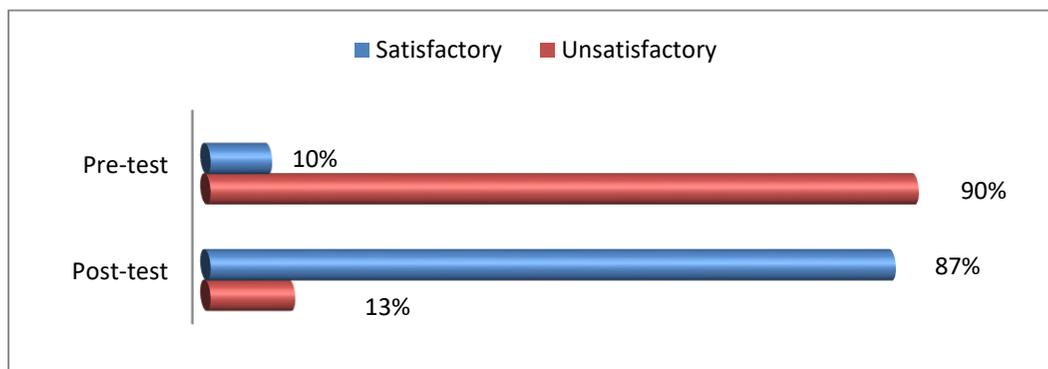


Figure (2): Distribution of the studied primigravida women according to their knowledge level about vitamin D deficiency pre/post- social-platform educational program intervention.

Table (3): Distribution of the studied primigravida women according to their correct knowledge regarding vitamin D deficiency pre/post- social-platform educational program intervention

Items	Pre(n=300)		Post(n=300)		X ²	P.value
	No	%	No	%		
Definition vitamin D	69	23.0	261	87.0	40.243	<0.001**
Sources of vitamin D	21	7.0	141	47.0	22.345	<0.001**
Normal level vitamin D	9	3.0	252	84.0	46.912	<0.001**
Benefits of Vitamin D	39	13.0	170	56.7	0.231	<0.001**
Sun exposure time	48	16.0	195	65.0	31.776	<0.001**
Exposed body parts to the sun	44	14.7	147	49.0	29.462	<0.001**
Definition of vitamin D deficiency	35	11.7	114	38.0	28.393	<0.001**
Causes of vitamin D deficiency	39	13.0	270	90.0	49.653	<0.001**
Signs and symptoms of vitamin D deficiency	35	11.7	195	65.0	35.653	<0.001**
Effect of vitamin D deficiency on pregnant woman health	20	6.7	141	47.0	8.654	<0.001**
Effect of vitamin D deficiency on pregnancy outcomes	12	4.0	201	67.0	33.443	<0.001**
Prevention of vitamin D deficiency	48	16.0	195	65.0	31.776	<0.001**
Treatment of vitamin D deficiency	21	7.0	270	90.0	8.412	<0.001**

X2: Value for comparing the pre and post

P:**: Highly Statistically significant at p<0.001

Table (4): Mean differences of primigravida women's knowledge pre/post- social-platform educational program intervention

Variable	Pre-intervention	Post-intervention	t-test	P-value
	Mean ±SD	Mean ±SD		
Definition of vitamin D	0.16 ±0.3	0.87±0.12	8.13	<0.001**
Sources of vitamin D	0.96 ±0.39	1.43±0.78	10.27	<0.001**
Normal level vitamin D	0.18 ±0.3	0.90±0.02	12.83	<0.001**
Benefits of Vitamin D	1.42±0.45	2.62±1.26	11.27	<0.001**
Sun exposure time	0.28 ±0.13	1.92±0.02	10.27	<0.001**
Exposed body parts to the sun	0.37 ±0.13	2.42±1.12	11.8	<0.001**
Definition of vitamin D deficiency	0.25 ±0.11	0.83±0.17	12.7	<0.001**
Causes of vitamin D deficiency	1.47± 0.48	2.67±1.13	10.16	<0.001**
Signs and symptoms of vitamin D deficiency	1.42±0.45	5.12±1.56	13.83	<0.001**
Effect of vitamin D deficiency on woman health& pregnancy outcomes	1.16±0.20	4.35±1.49	13.94	<0.001**
Prevention of vitamin D deficiency	1.43±0.42	3.16±0.83	12.29	<0.001**
Treatment of vitamin D deficiency	1.20±0.74	3.36±0.95	10.24	<0.001**
The total mean score of knowledge	5.6±1.89	27.43±2.23	19.36	<0.001**

t: paired sample t-test

P:**: Highly Statistically significant at p<0.001

Table (5): Distribution of the studied primigravida women regarding their opinion about social-platform educational program implementation (N=300).

Items	N 300	%
The importance of the topic for primigravida women	290	96.7
The contents of the program enough	300	100
The media used clear	300	100
The time of the program enough	289	96.3
The program satisfied	300	100

Discussion:

Pre-eclampsia, gestational diabetes mellitus, preterm birth, and other tissue-specific conditions have all been linked to vitamin D deficiency, which is thought to be common among pregnant women in some populations (WHO, 2019). Vitamin D deficiency in pregnant mothers is a widespread and significant global public health problem (Larquet et al., 2018).

Vitamin D deficiency has been linked to an increased risk of numerous diseases and is said to be widespread worldwide. According to Lucas (2015), high blood levels of vitamin D have been recommended for optimal health, and vitamin D deficiency has increased and continues to be a widespread public health issue in many nations. Even in sun-rich areas, pregnant women have a high prevalence of vitamin D deficiency (Ates et al., 2016).

Regarding personal information, the present study revealed that two-thirds of studied primigravida women were between the ages of 18 < and 25. This finding is consistent with the study done by Nowreen and Hameed (2019) to assess awareness about vitamin D and its prevention among female medical students in India's they found that nearly two-thirds were between the ages of 17 and 20.

In addition, this result is not comparable to that of Al-Qudah et al. (2021), who presented the findings of a Jordanian study to assess maternal awareness of vitamin D deficiency in infants and children under the age of six. In their study, three-fifths of the participants were between the ages of 30 and 40. also, Hong-Bi et al., 2018 & Prasad et al., 2018 mentioned that the majority of the pregnant women who participated in their study were between the ages of twenty-two and thirty-four and more than half of the sample was older than thirty respectively.

The current study revealed that the minority (6%) had University educational level. In contrast to Al-Qudah et al. (2021), who reported that three-fifths of respondents had a bachelor's degree, it was established that less than one-third of respondents had secondary education.

The presented study findings indicated that almost all of the studied women were not working these findings agreement with the same results detected by Kavitha et al, (2015) performed a study regarding knowledge, attitude, and regarding among antenatal and reported that the majority of the studied sample of pregnant mothers wasn't working during their knowledge, practice and attitude regarding VDD.

According to the findings of this study, three-fifths of the primigravida women stated that doctors were their primary source of information regarding vitamin D deficiency. This may be contributing to the lack of vitamin D deficiency knowledge from other sources. This was in contradiction to the findings of Kamel et al. (2017), who carried out a study to assess VDD awareness among mothers in the Kalyobia Governorate "They found that less than half of the mothers had received information about vitamin D and its deficiency from doctors.

The current study findings also contradicted the findings of Kavitha et al. (2015) who noted that books and magazines were the primary sources of information for more than half of the women studied. Also, Dahan et al. (2019), stated that nurses were the primary source of information and practice of mothers about vitamin D efficiency on infant health. In addition, a Saudi Arabian study done by Al-Agha et al. (2016) found that the main source of vitamin D knowledge was the media among Jeddah Population.

The current study found that the knowledge of primigravida women about vitamin D deficiency before and after the social-platform educational program intervention was significantly different ($P < 0.001$), according to the findings. From the researchers' perspective, this result demonstrates the educational program intervention's positive impact.

This study found that only ten percent of the primigravida women had satisfactory knowledge of Vitamin D deficiency pre compared to the majority had satisfactory knowledge of Vitamin D deficiency post the social-platform educational program intervention with a statistically significant

difference between the pre-and post-social-platform educational program interventions, indicating that the social-platform educational program intervention had a positive impact on knowledge enhancement. The significant changes in participants' knowledge that reflected the main objectives of the social-platform educational program intervention have been confirmed. This result is consistent with the findings of the study "to assess Changes in maternal knowledge changes regarding vitamin D and its health importance after application of an educational program" by **Shaheen et al. (2021)** also the same results were found by **Daghan et al, (2019)**. The same observation was also made by **Rasheed et al. (2017)**, who evaluated the "Knowledge, attitude, and practice of Iraqi mothers toward Vitamin D supplementation for their infants **Franklin (2019)**, who evaluated "knowledge and attitudes of vitamin D and sun exposure practices amongst New Zealand mothers," also reported the same results.

Pre- and post-social-platform educational program intervention, primigravida women's knowledge of vitamin D deficiency differed significantly, according to the current study. This result, in the opinion of the researchers, demonstrates that the social-platform educational program intervention meets the requirements of the studied primigravida women and provides them with sufficient information. **Al-ghraibawi et al. (2019)**, in their study about vitamin d deficiency knowledge and practices among women in Karbala," found that Three-fifths of the women who took part in the study gave incorrect responses to questions about diseases caused by vitamin D deficiency in women and children on the pretest, but their responses improved after the program.

Finally, the study findings supported that all of the studied primigravida women reported that the contents were enough and were satisfied with the social-platform educational program. Concerning its effect on knowledge, all of them reported that it improved their knowledge.

Conclusion:

The present study concluded, based on the findings, that the implementation of social-

platform educational programs effectively increased primigravida women's knowledge of vitamin D deficiency during pregnancy. Additionally, the findings addressed the research's significant improvement in vitamin D deficiency knowledge scores for primigravida women following the implementation of the social-platform educational program, which showed a highly statistically significant difference between the pre-test and post-test mean scores of knowledge.

Recommendations:

Based on the present study findings, the following recommendations were derived:

- The provision of continuing education programs is recommended to increase primigravida women's knowledge about the importance of adequate intake of vitamin D to improve pregnancy outcomes.
- In health centers, all primigravida women should be given brochures, posters, and booklets about the disease and health practices.
- Vitamin D deficiency and its associations with fetal and maternal outcomes require the implementation of additional studies.
- To generalize the findings, subsequent studies included replication on a large sample of Egyptians in a variety of settings.

References:

- Abdel Nabi E., Shafik S., Ghandour A. & Saad A., (2020): Female Awareness Regarding Vitamin D Deficiency, IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320–1959.pISSN: 2320–1940 Volume 9, Issue 1 Ser. II. (Jan - Feb), P.p. 05-15. www.iosrjournals.org
- Aghaei F., Heidarnia A., Allahverdipour H., Eslami M. & Ghaffarifar S., (2021): Knowledge, attitude, performance, and determinant factors of Vitamin D deficiency prevention behaviors among Iranian pregnant women, Archives of Public Health, 79:224, P.p. 12.
- Alamoudi L., Almuteeri R., Al-Otaibi M., Alshaer D., Fatani S., Alghamdi M., & Safdar O., (2019): Awareness of

- Vitamin D Deficiency among the General Population in Jeddah, Saudi Arabia; *Journal of Nutrition and Metabolism*, Vol. 2019, Article ID 4138187, 7 pages. <https://doi.org/10.1155/2019/4138187>
- AlFaris N., AlKehayez N., AlMushawah F., AlNaem A., AlAmri N. & AlMudawah E., (2019): Vitamin D Deficiency and Associated Risk Factors in Women from Riyadh, Saudi Arabia, *Scientific Reports* 9:20371 <https://doi.org/10.1038/s41598-019-56830-z> 1.
- Al-ghraibawi S., Al-ghabban S. & Al-zubaidy R., (2019): Knowledge and practices regarding vitamin d deficiency among women attending Imam Hussein Medical City in Karbala, *International Journal of Current Pharmaceutical Research* ISSN0975-7066 11 (6): 39-43.
- Al-Qudah S., Abuhussein L. & Al Sbahi S., (2021): Maternal Awareness of Vitamin D Deficiency in Infants and up to the Age of 6 Years: A Cross-Sectional Study in Jordan
- Anishlyn R., Punnose A., Shiji P. & D'Silva P., (2018): Knowledge on Vitamin D Deficiency among Antenatal Women in a View to Prepare Information Guide Sheet, *Nitte University Journal of Health Science*.
- Ates, S., Sevet, O., Ozcan, P., Ozkal, F., Kaya, M., & Dane, B., (2016): Vitamin D status in the first-trimester: effects of Vitamin D deficiency on pregnancy outcomes, *African Health Sciences* <http://dx.doi.org/10.4314/ahs.v16i1.5>
- Cherak, S.J., Rosgen, B.K., Amarbayan, M., Plotnikoff, K., Wollny, K., Stelfox, H.T., & Fi est, K.M. (2020). Impact of social media interventions and tools among informal caregivers of critically ill patients after patient admission to the intensive care unit: A scoping review. *PloSone*;15(9),e0238803.
- Dağhan Ş, Toraman A., Yelten G., Taşkıran G. & Savan F., (2019): Knowledge and Practices of Mothers Regarding Use of Vitamin D for Infant Health, *JCP* 2019;17(1):58-70.
- Debra, R. (2020): The Benefits of Vitamin D available at: <https://www.healthline.com>.
- Fogacci S., Fogacci F., Banach M., Michos E., Hernandez A., Blaha M., Toth P., Borghi C. & Cicero A., (2019): Vitamin D supplementation and incident preeclampsia: A systematic review and meta-analysis of randomized clinical trials, *Clinical Nutrition*, <https://doi.org/10.1016/j.clnu.2019.08.015>.
- Franklin M., (2019): Knowledge and attitudes of vitamin D and sun exposure practices amongst New Zealand mothers with children aged five years old and under. A thesis presented in partial fulfillment of the requirements for the degree of Master of Science in Nutrition and Dietetics Massey University, Albany New Zealand, P.p. 1-61.
- Ganguly, A., Tamblyn, J., Finn-Sell, S., Chan, S., Westwood, M., Gupta, J., Kilby, M., Gross, S., & Hewison, M., (2018): Vitamin D, the placenta and early pregnancy: effects on trophoblast function, *Journal of Endocrinology*, available at: m.hewison@bham.ac.uk <https://doi.org/10.1530/JOE-17-0491> <http://joe.endocrinology-journals.org>
- Hashem R., Abed Elhafez H. & Abed Elwahed R., (2020): Effect of Counseling about Vitamin D Deficiency Among Pregnant Women in Abo-teg Health Center, *Assiut Scientific Nursing Journal*, Vol. , (8) No., (23) December, P.p. (205-216).
- Hong-Bi, S., Yin, X., Xiaowu, Y., Ying, W., Yang, X., Ting, C., & Na, W., (2018): High prevalence of vitamin D deficiency in pregnant women and its relationship with adverse pregnancy outcomes, *Journal of International Medical Research* <http://www.creativecommons.org/licenses/bync/4.0/>
- Kamel W., Abd El-Hamid H., Abd El-Megeed H. & Mohy ElDeen H., (2017): Mothers' Awareness regarding Vitamin D Deficiency among Their Infants in Kalyobia Governorate *Menoufia Nursing Journal*, Vol.2, No.1.
- Kavitha D., Anjalakshi Ch., Rukmani P. & Murali R., (2015): Knowledge, attitude and practice regarding vitamin d deficiency among antenatal mothers in tamilnadu: a phenomenological study,

- Asia Pacific Journal of Research, Vol. I. Issue XXXI, P.p. 109-121.
- Larqu, E., Morales, E., Leis, R., & Carnero, J., (2018): Maternal and Foetal Health Implications of Vitamin D Status during Pregnancy, [https:// doi. org/ 10. 1159/ 000487370](https://doi.org/10.1159/000487370)
- Lucas, R., (2015): Vitamin D deficiency, nursing in practice. <https://www.nursinginpractice.com/>
- Manandhar P., Manandhar N. & Joshi S., (2020): Knowledge, Attitude and Practice about Vitamin D among Pregnant Women at a Municipality of Bhaktapur, J Nepal Med Assoc.; 58(232):1036-40.
- Massoud, M., Rizk, M., Mahfouz, A., & Mahmoud, N., (2018): Vitamin D status in a neonate–mother pair attending Alexandria University Children’s Hospital during the first week of life. Alex J Pediatr [serial online] 2018 [cited 2020 Nov 22]; 31:52-8. Available from: <http://www.ajp.eg.net/text.asp?2018/31/2/52/247304>.
- Mortensen C., Tetens I., Kristensen M., Bailey P. & Beck A., (2022): Adherence and barriers to the vitamin D and calcium supplement recommendation at Danish nursing homes: A cross-sectional study. BMC Geriatrics; 22(1), [27]. <https://doi.org/10.1186/s12877-021-02719-4>.
- National Institutes of Health, (2020): Dietary Supplement Fact Sheet, Vitamin D: Fact sheet for Health Professionals. <https://ods.od.nih.gov/factsheets/VitaminDHealthProfessional/>
- Nowreen N. & Hameed R., (2019): Awareness regarding the importance of vitamin D and prevention of its deficiency among female undergraduate medical students. International Journal of Basic & Clinical Pharmacology, Vol. 8(5): 865.
- Prasad, D., Singh, K., & Nisha, S., (2018): Vitamin D in pregnancy and its correlation with feto-maternal outcome. International Journal of Contemporary Medical Research.
- Raif, M., Sabry, M., Abdelbaky, S., Eid, M., Nasr, S., & Hendawy, M., (2015): Vitamin D deficiency among healthy Egyptian females, Ain Shams, Egypt. available at: <http://www.elsevier.es/>
- Rasheed T., Taha H. & Rasheed B., (2017): Knowledge, attitude and practice of Iraqi mothers towards Vitamin D supplementation to their infants in Baghdad Al –Rusafa, Al-Kindy College Medical Journal 2017: Vol.13 (2): 111-116.
- Shaheen H., Tawfeek H. & Alkalash S., (2021): Changes in maternal knowledge regarding vitamin D and its health importance after application of an educational program, Menoufia Medical Journal, 34:538–543.
- Siddiqee M., Bhattacharjee B., Hasan M., Dhaka Sh., Hassan M., Rouf R., Siddiqi U. Rabbi F. & Siddiqi U., (2022): Risk perception of sun exposure and knowledge of vitamin D among the healthcare providers in a high-risk country: A cross-sectional study, research square, version 1.
- Siemens Healthineers (2019): Vitamin D available at: <https://www.siemenshealthineers.com/en-usa/bone-metabolism/fag-cdcvitamin-d>
- Soliman N., Wahdan M., Abouelezz N. & Sabbour S., (2020): Knowledge, Attitude and Practice towards Vitamin D Importance and Supplementation among Mothers of under Five Children in a Primary Health Care Center in Cairo, 38 (4): 62-75.
- Statsita. (2019). Leading social networks worldwide as of July 2019, ranked by the number of active users (in millions). Available from: [https:// www. statista. com/ statistics/272014/global-social-networks-ranked-by-number-of-users/](https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/).
- World Health Organization (2019): Vitamin D supplementation during pregnancy, available at: <http://who.net/> Vitamin D supplementation during pregnancy.