Impact of Educational Guidelines on Premenopausal Women's Knowledge, Attitude, and Practices regarding Vitamin D Deficiency

Zeinab Ali Baraia [1], Azza Mohamed El-Sayed Atwa[2] Mona Mohamed Gomaa [3], Hanan Kheir Abd Ellatif Elmowafi [4], Ekbal Ebrahim Abdelmenem[5]

[1]Lecturer of Maternity, Obstetric and Gynecological Nursing; Faculty of Nursing, Suez Canal University, Ismailia Egypt
[2]Assistant professor of Obstetrics and Gynecology Nursing, Faculty of Nursing, Sohag University, Egypt
[3, 5] Lecturer of Maternal and Neonatal Health Nursing Department, Faculty of Nursing, Tanta university
[4]Lecturer of Community Health Nursing- Faculty of Nursing – Mansoura University, Egypt

Abstract:

Background: Menopause simply means the stoppage of menstruation. It also refers to the changes women go through around this period. Vitamin D deficiency is more common in premenopausal women than previously thought and it may impair quality of life mainly due to lack of awareness about the importance of vitamin D and prevention of its deficiency. **Aim**: This study aimed to investigate the impact of educational guidelines on premenopausal women's knowledge, attitude, and practices regarding vitamin D deficiency. **Research design**: A quasi-experimental (Pre-post-test) research design was used to achieve the aim of this study. **Sample**: A Purposive sample included 300 premenopausal women. **Setting:** The study was conducted in a gynecology outpatient clinic at Sohag University Hospital. **Tools**: four tools were used to collect the data as follows: Tool (I): Structured interviewing questionnaire to assess premenopausal women's personal characteristics and their knowledge regarding vitamin D deficiency, Tool (II): Lirket scale to assess premenopausal women's attitude regarding vitamin D deficiency, and Tool (III): Premenopausal women's practice regarding vitamin D deficiency. **Result**: The study revealed that there were statistically significant improvements in knowledge, attitudes, and practice among premenopausal women pre & post-training educational guidelines ($P<0.001$). The total knowledge score, total attitude, and total practice of the studied sample showed a positive correlation regarding vitamin D deficiency $p<0.001$. **Conclusion**: The study concluded that educational guidelines had a positive effect on improving premenopausal women's knowledge, attitudes, and practice regarding vitamin D deficiency. **Recommendations**: There is a need for creating simple Arabic printed educational materials such as (booklets, pamphlets, and posters) regarding vitamin D deficiency can improve Knowledge, attitudes, and practice among premenopausal women. Replication of the current study with a larger sample in different settings is required to generalize the results.

Keywords: Educational guidelines, Knowledge, attitudes, and practice, Premenopausal women, Vitamin D deficiency.

Introduction:

A fat-soluble "sunshine vitamin" is vitamin D. It develops when the skin is exposed to ultraviolet light from the sun. An estimated one billion people worldwide suffer from vitamin D deficiency or insufficiency, making vitamin D deficiency a widely prevalent issue **(Soliman et al, 2020 & National Institutes of Health, 2020)**.

Vitamin D deficiency is a well-recognized epidemic problem worldwide. Also common in older adults especially in women. Vitamin D deficiency was present in 37.80% of premenopausal and 51.21% of postmenopausal women, and vitamin D insufficiency was reported in 2.43% of peri and 6.09% of postmenopausal women. Only 2.43% of premenopausal women found sufficient serum vitamin D levels **(Huang et al., 2020).**

Maintaining bone health requires vitamin D. Furthermore, it is essential for preserving cardiovascular health and averting chronic illnesses. Many different foods contain it, including fatty seafood (such as salmon, tuna, and mackerel), cheese, egg yolks, and beef liver (**Manandhar et al., 2020**). Many things can contribute to Vitamin D deficiency, such as limited exposure to sunlight. Eating habits are changing, which leads to low dietary intake.

Diets high in fiber contain phytates and phosphates, which can increase the need for calcium and deplete vitamin D stores **(Aghaei et al, 2021 & Mortensen et al, 2022).**

Most women experience menopause between ages 40 and 58. The average age is 51. Perimenopause or "menopause transition" can begin eight to 10 years before menopause, when the ovaries gradually produce less estrogen **(Hashem et al, 2020)**. Perimenopause lasts up until menopause, thepoint when the ovaries stop releasing eggs. In the last one to two years of perimenopause, the drop in estrogen accelerates. At this stage, many women may experience menopause symptoms. Women are still having menstrual cycles during this time and can get pregnant **(The North American Menopause, 2020).**

Vitamin D deficiency means not having enough vitamin D in the body. Vitamin D is unique because the skin produces it by using sunlight. Subclinical" vitamin D deficiency or vitamin D insufficiency is common and is defined as a lower than normal vitamin D level that has no visible signs or symptoms**.** It is now being increasingly associated with non-classical roles, like linking it with autoimmune diseases as well as chronic diseases like type II diabetes mellitus, multiple sclerosis, hypertension, cardiovascular diseases as well and cancer **(Giustina et al., 2019).**

Increasing the morbidity status of women led to a study on the vitamin D status in perimenopausal women is essential, for early identification and focus on promoting health, in preventing the disease in later life. Such morbidity reduction may have a positive impact on women's quality of life and may reduce financial consequences. Hence, the present study mainly focuses on the role of vitamin D status affecting the quality of life in perimenopausal women **(Kumari & Kumari, 2019)).**

Nurses play an important role in the prevention and management of vitamin D deficiency through early detection and assessment of vitamin D deficiency in the community and motivation to create awareness about vitamin D deficiency in thecommunity by encouraging women to measure calcium, vitamin D levels, and provide health education about lifestyle modification such as exposure to sunlight, maintaining normal body weight, eating calcium and vitamin D rich foods, intake of calcium and vitamin D supplements. Taking these preventive measures at the right time will reduce the occurrence of vitamin D deficiency; thereby it improves the quality of life of pre and post-menopausal women **(Helen, 2016).**

Since knowledge, attitude, and behavior are critical and lead to Vitamin D deficiency or inadequacy, professional health nurses are essential in preventing Vitamin D deficiency. This is demonstrated by a plethora of readings from around the globe. Since it is impossible to get enough vitamin D from diet alone, nurses can take immediate action to raise awareness of vitamin D deficiency and teach mothers about sun exposure and its sources of vitamin D **(Maheswari et al., 2020)**.

Significance of the study:

In both developed and developing nations, vitamin D deficiency is a major public health concern. In the Middle East and North Africa, which includes Egypt, the rate of vitamin D deficiency is extremely high, reaching 81% among different age groups. Egypt's prevalence of vitamin D deficiency has epidemic proportions, particularly among Egyptian women. According to a study done on 5046 people in Egypt, severe vitamin D deficiency affected 34.3% of females **(Botros et al., 2019, Abd el Nabi et al., 2020 & Mangaiyarkarasi et al, 2021)**.

The National Council for Women observed that 80% of Egyptian and Middle Eastern women, ranging in age from thirty to sixty, lacked sufficient amounts of vitamin D. Vitamin D helps reduce the risk of certain cancers, as well as autoimmune, cardiovascular, and infectious diseases, in addition to its effects on bone health and the metabolism of calcium (Ca) and phosphorus (P) **(The National Council for women 2018)**. Numerous studies demonstrate that in many nations, there is a lack of understanding about the importance of vitamin D and its sources, which could be a risk

factor. If women receive adequate vitamin D education and follow nutritional guidelines, complications from vitamin D deficiency can be avoided during the premenopausal stage (**AlFaris et al, 2019)**. A crucial role played by community health and gynecological nurses is creating a meaningful understanding of vitamin D deficiency **(Abdel Nabi et al, 2020)**.

Aim of the study:

To investigate the impact of educational guidelines on premenopausal women's knowledge, attitude, and practices regarding vitamin D deficiency**.**

Research hypothesis:

- Premenopausal women who will receive educational guidelines will have satisfactory knowledge regarding vitamin D deficiency after the educational guidelines than before the educational guidelines.

- Premenopausal women who will receive educational guidelines will have a positive attitude regarding vitamin D deficiency after the educational guidelines than before the educational guidelines.

- Premenopausal women who will receive educational guidelines will have adequate practice regarding vitamin D deficiency after the educational guidelines than before the educational guidelines.

- There will be a significant difference between pre-test and post-test levels of knowledge, attitude, and practice scores regarding vitamin D deficiency.

Subjects and Method:

Research design:

A quasi-experimental (Pre-post-test) research design was used to achieve the aim of this study.

Settings:

The study was conducted in the Gynecology Outpatient Clinic at Sohag University Hospital.

Sample:

A Purposive sample of 300 premenopausal women was selected

Sample size calculation:

The sample was collected through this formula:

$$n = \frac{N}{1 + N(e)^2}$$

"n" represents the sample size.

"N" represents the total number of premenopausal women who visited the previously selected settings during the previous six months in 2023.

N = 5315 'e' is Factor coefficient = 0.05

313 is the estimated sample size. There were 300 samples in total.

Inclusion Criteria:

The study included the premenopausal woman in the age group of 40-44 years who were presented at the study time and expressed their willingness to take part in the study.

Exclusion Criteria:

Included women who refused to participate in the study and had received hormone replacement treatment.

Tool of the study:

Three tools were used to collect the data as follows:

Tool (I): Structured interviewing questionnaire to assess premenopausal women's characteristics and their knowledge regarding vitamin D deficiency, The researchers created the questionnaire following a review of pertinent literature (**Abdel Nabi et al., 2020; National Institutes of Health, 2020; &Mortensen et al., 2022);** it consisted of three parts:

Part I: It included the general characteristics of the study sample as age, residence, education level, and occupational status.

Part II: It is designed to assess premenopausal women's knowledge regarding vitamin D deficiency as definition, causes, risk factors, complications, Vitamin D benefits, suitable time to be exposed to the sun, diseases associated with vitamin D deficiency, and symptoms of vitamin D deficiency, parts of the body that should be exposed to the sun, treatment and preventive measures.

Knowledge scoring system:

The scoring system for premenopausal women's knowledge was calculated as the following: (2) scores for complete answers, (1) scores for incomplete answers and (0) for wrong answers or didn't know. The mean score for each area of knowledge was calculated by adding up all of the item scores and dividing the result by the total number of items. A percentage score was created from these scores. According to **Ibrahima and Abd El-Makhsoud (2018**), a score of ≥75% was deemed Good for the overall knowledge score, ≥50% for fair 50 -< 75%, and <50% for Poor.

Tool (II): Lirket Attitude scale to assess premenopausal women's attitude regarding vitamin D deficiency.

It was adapted from **Parisa, et al, (2017)** to assess premenopausal women's attitudes regarding vitamin D deficiency. It consisted of 12 statements with 3 responses "disagrees, uncertain, agree".

Scoring system:

Each statement had three possible answers: (1) disagree, (2) uncertain, and (3) agree. The total attitude score ranged from 12 to 36, with negative attitudes accounting for less than 65% of the total score and positive attitudes accounting for more than or equal to 65% of the total score.

Tool (III): Premenopausal women's practices regarding vitamin D deficiency.

The researchers created the questionnaire following a review of pertinent literature (**Botros et al., 2019; Abdel Nabi et al., 2020; National Institutes of Health, 2020; &Mortensen et al., 2022**). It is designed to assess women's reported practices regarding vitamin D deficiency as sun exposure, diet, and dailyactivity.

Scoring system:

The following system was used to calculate the women's reported practices scoring system: (1) points for an incomplete response, (2) points for a complete response, and (0) for wrong answer or didn't know. For each area, the scores of the items were summed up, and the total was divided by the number of the items, giving the mean score for the part. These scores were converted to a percentage score. The premenopausal women's practices were considered Adequate if the percentage score was 60% or more and inadequate if was less than 60%.

Face Validity:

Following their evaluation of the tool, the necessary changes were made. Five experts from the Faculty of Nursing's Community Health and Obstetric Health Nursing Departments assessed the tools' content validity as well as their clarity, comprehensiveness, appropriateness, and relevance.

Reliability:

Cronbach's Alpha was used to determine the reliability; values for Tools I, II, and III were 0.871, 0.763, and 0.738, respectively.

Method:

The Preparatory phase:

It included reviewing current, past, local, and international related literature and theoretical knowledge of various aspects of the study using books, articles, the internet,

periodicals, and magazines to develop tools for data collection. The developed tools were examined by experts to test their reliability to the study.

Ethical considerations:

According to the Sohag University Faculty of Nursing's Ethical Review Committee, all ethical concerns about research were addressed. Before enrollment, each participant received a thorough explanation of the study's goals. Participants received assurances that their answers would remain private. Confidentiality of the data gathered was guaranteed, and informed consent was obtained. The research was applied without posing any risk to the study participants. Research participants are free to decline participation or to leave the study at any time for any reason.

Pilot study:

Since there were no changes, it was only done on 10% (30) of premenopausal women who were included in the study. The pilot study's objectives were to assess the tool's application, clarity, and simplicity as well as how long it would take to complete the developed tool.

Administrative phase:

An official letter of approval was obtained from the Dean of the Faculty of Nursing, Sohag University Hospital to conduct the study after a full explanation of the study's aim. The letter involved an agreement to perform the study at the previously selected setting.

Fieldwork:

Beginning on July 1st, 2023, and ending on October 31st, 2023, when data collection took place. Three days a week, the women were met by the researchers in the previously described setting, and each interview lasted roughly twenty to thirty minutes. In the initial meeting with premenopausal women, the researchers gave an introduction, covered all the details of the study's goals, duration, and procedures, and obtained verbal consent. Upon completing the structured form and pretest during the initial meeting, the researchers provided a booklet to each participating premenopausal woman and explained the contents of the educational guidelines.

- The study was implemented throughout three phases: assessment, implementation, and evaluation.

I-Assessment phase:

Before gathering data, the premenopausal women were explained the purpose and anticipated results of the study by the researchers, who then asked them to fill out the tools. The mean duration needed to finish every tool was approximately 20:30 minutes. Tool II and Tool III, the data collection instruments, served as pre- and post-educational guidelines. Pre-testing instruments were employed to evaluate the premenopausal women's level of practice, attitude, and knowledge regarding vitamin D deficiency. The data collection tools were distributed to the studied premenopausal women twice; (1) pre-test to assess their knowledge, attitude, and practice level pre-implementation of the educational guidelines and (II) post-educational guidelines.

II. Implementation Phase:

For four sessions, each group comprised twenty premenopausal women. To make sure everyone understood the study topics, sessions were conducted in Arabic with some visual assistance.

Teaching strategies and materials: The researchers employed PowerPoint presentations, lectures, and discussions to teach premenopausal women. They also provided handouts in Arabic that were simple enough for them to understand, and they gave these to each woman post the conclusion of the educational guidelines.

Sessions: There were four sessions covering the material in the educational guidelines:

Session one: An introductory session that emphasized establishing good relations between the researchers and the women participating in the study and an explanation of the purpose of the program

Session two: Included information on various aspects of vitamin D deficiency was composed specifically for women such as definition, causes, risk factors, complications, Vitamin D benefits, suitable time to be exposed to the sun, and diseases associated with vitamin D deficiency.

Session three: It was composed of information for women concerning symptoms of vitamin D deficiency, parts of the body that should be exposed to the sun, treatment, and preventive measures.

Session four: It was composed of information for women concerning sun exposure, diet, and physical activity.

The general objectives of the educational guidelines were to improve premenopausal women's knowledge, attitude, and practices regarding vitamin D deficiency**.**

Specific objectives: At the end of the educational guidelines the studied premenopausal women were able to:

- introduction about vitamin D and vitamin D deficiency
- meaning of vitamin D deficiency
- benefits and importance of vitamin D deficiency
- causes of vitamin D deficiency
- risk factor of vitamin D deficiency
- complications of vitamin D deficiency
- suitable time to be exposed to the sun
- Diseases associated with vitamin D deficiency
- Symptoms of vitamin D deficiency
- Parts of the body that should be exposed to the sun
- Treatment and preventive measures.

III. Evaluation phase:

Premenopausal women were re-interviewed to assess their knowledge, attitude, and practice level regarding vitamin D deficiency. The same tools used in the pretest with two assessments were utilized to measure Premenopausal women's knowledge, attitude, and practice level regarding vitamin D deficiency after two months.

Statistical analysis:

Utilizing SPSS V.20, the data was tabulated and evaluated. Before any additional statistical analysis, the data was checked for homogeneity variances and normality using the Anderson-Darling test. While frequency and percentage were used to analyze qualitative data, they were analyzed using the Chi-square test and Fisher exact test to compare two independent qualitative variables and the t-test, ANOVA test, and multivariate linear regression to compare two independent quantitative variables. Descriptive data was analyzed using the mean value and SD for the quantitative data. Statistical significance was established at a two-tailed $p<0.05$.

Results:

Table (1): shows that the premenopausal women age mean age (**41.22+1.66**), 70.0% of them from urban areas, 35% of them were Secondary educated and 60 % were not working.

From Figure (1), it was observed that three-fifths (60 %) of the studied premenopausal women reported that they received their knowledge from healthcare providers.

Table (2): Shows that there was a highly significant difference and improvement between all items of knowledge regarding vitamin D deficiency among the studied premenopausal women as the premenopausal women had higher knowledge scores in all knowledge items post-educational guidelines implementation

than pre-guidelines implementation (p-value <0.001**).

Figure (2): Portrays that there were statistically significant improvements in all items of Premenopausal women's total knowledge pre and post-educational guidelines implementation. Additionally, it demonstrates that 10% of the premenopausal women had a good knowledge level regarding vitamin D deficiency pre-educational guidelines implementation which increases to 75% post-educational guidelines implementation

Table (3): Shows that there was a highly significant difference and improvement between attitudes toward vitamin D deficiency among the studied premenopausal women post-educational guidelines implementation than guidelines implementation (p-value <0.001**).

Figure (3): Portrays that there were statistically significant improvements in premenopausal women's total attitude pre and post-educational guidelines implementation. Additionally, it demonstrates that 32% of them had a positive attitude level regarding **vitamin D deficiency** pre-educational guidelines implementation which improved to 70% post-educational guidelines implementation.

The data presented in Table (4) indicates that there were statistically significant differences (p-value = <0.001) between the pre- and post-test total scores of vitamin D practices among women who had not reached menopause.

Figure 4 illustrates that 80% of the studied **premenopausal women** had an inadequate level of practice pre-educational guidelines as compared with only 18% post-educational guidelines. On the other hand, only 20% of the studied **premenopausal women** had an adequate level of practice pre-educational guidelines as compared with three-quarters (82%) post-instructional guidelines. This figure also shows highly statistically significant improvements and differences in the total practice level in pre and post-educational guidelines implementation.

There was a significant correlation (p value<0.001) between knowledge and attitude; knowledge and practice; attitude and practice (**Table 5**).

Table (1): Personal characteristics among premenopausal women (n=300).

Personal Characteristics	No	%
Age group		
Mean ±SD	**41.22+1.66**	
Residence		
Urban	210	70.0
Rural	90	30.0
Education		
Uneducated	51	17.0
reads and writes	30	10.0
Primary education	24	8.0
Secondary education	105	35.0
University	90	30.0
Occupation		
Working	90	30.0
Not working	210	70.0

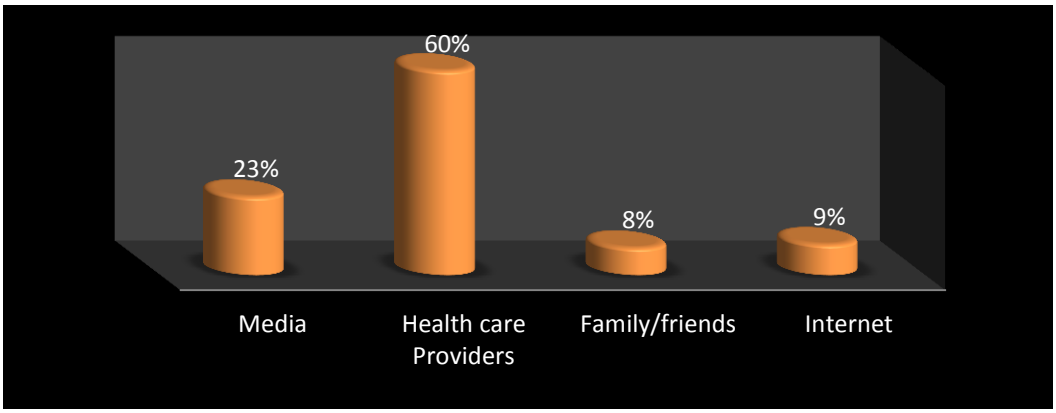

Figure (1): Source of information among the studied premenopausal women regarding vitamin D deficiency.

Table (2): Premenopausal women's knowledge regarding vitamin D deficiency pre and post-educational guidelines (n=300).

Premenopausal women's knowledge	Pre-educational guidelines		Post-educational guidelines		P value
	No	%	No	%	
Definition of Vitamin D					
Incorrect	222	74.0	300	100.0	**<0.001****
Correct	78	26.0	0	0.0	
Definition of Vitamin D deficiency					
Incorrect	180	60.0	300	100.0	**<0.001****
Correct	120	40.0	0	0.0	
Causes of vitamin D deficiency					
Incorrect	231	77.0	30	10.0	**<0.001****
Correct	69	23.0	270	90.0	
Vitamin D benefits					
Incorrect	198	66.0	60	20.0	**<0.001****
Correct	102	34.0	240	80.0	
Risk factors of vitamin D deficiency					
Incorrect	162	54.0	24	8.0	**<0.001****
Correct	92	46.0	276	92.0	
Sources of vitamin D:					
Incorrect	234	78.0	69	23.0	<0.001**
Correct	66	22.0	231	77.0	
Diseases of vitamin D deficiency in women:					
Incorrect	195	65.0	33	11.0	
Correct	105	35.0	267	89.0	
Symptoms of VDD in women:					
Incorrect	243	81.0	36	12.0	**<0.001****
Correct	57	19.0	264	88.0	
Parts of the body that should be exposed to the sun					
Incorrect	180	60.0	54	18.0	**<0.001****
Correct	120	40.0	246	82.0	
Complications of vitamin D deficiency					
Incorrect	270	90.0	90	30.0	**<0.001****
Correct	30	10.0	210	70.0	
Treatment of vitamin D deficiency					
Incorrect	207	69.0	72	24.0	**<0.001****
Correct	93	31.0	228	76.0	

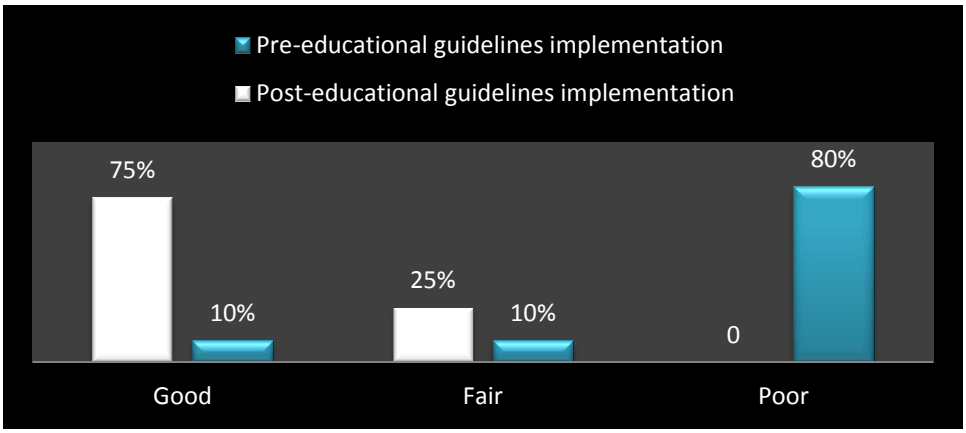

Figure (2): Premenopausal women's total knowledge level regarding vitamin D deficiency pre and post-educational guidelines

Table (3):- Premenopausal women's attitude regarding vitamin D deficiency pre and post-educational guidelines (n=300)

Premenopausal women's attitude	Pre-educational guidelines		Post-educational guidelines		P value
	No	%	No	%	
Osteoporosis is one of the most serious bone diseases and is caused by a deficiency in vitamin D.	45	15.0	219	73.0	**<0.001****
I get sun exposure to lower my risk of osteoporosis.	54	18.0	252	84.0	**<0.001****
Depression results from my decreased social activity due to a vitamin D deficiency.	51	17.0	249	83.0	**<0.001****
One potential cause of vitamin D deficiency could be a diet lacking in seafood.	60	20.0	219	73.0	**<0.001****
I must spend every day in the sun to prevent a vitamin D deficiency.	69	23.0	258	86.0	**<0.001****
I take supplements when I'm deficient in vitamin D because they work better than eating food and being outside in the sun.	90	30.0	225	75.0	**<0.001****
It is against the law to work indoors all the time and avoid sunlight, which is needed to produce vitamin D.	81	27.0	270	90.0	**<0.001****
Vitamin D deficiency must be treated with dietary supplements; it cannot be prevented.	69	23.0	219	73.0	**<0.001****
One of the challenges that prevents these foodstuffs rich in vitamin D from being provided is their high cost.	111	37.0	228	76.0	**<0.001****
I always apply sunscreen before heading outside, even for a brief duration, to prevent vitamin D deficiency and its associated complications.	57	19.0	243	81.0	**<0.001****
I only take supplements when I'm not in the sun to prevent vitamin D deficiency and its consequences.	60	20.0	240	80.0	**<0.001****

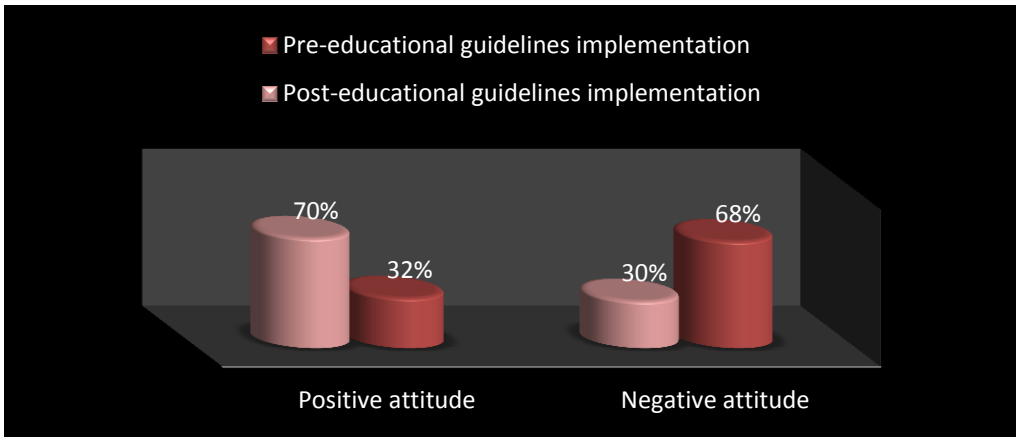

Figure (3): Total attitude level among the studied premenopausal women regarding vitamin D deficiency pre and post-educational guidelines implementation (n=300).

Table (4):- Premenopausal women's practices regarding vitamin D deficiency pre and post-educational guidelines (n=300)

Premenopausal women's practices	Pre-educational guidelines		Post-educational guidelines		P value
	No	%			
Exposure to sunlight					
Yes	87	29.0	240	80.0	**<0.001****
No	213	71.0	60	20	
Time suitable for exposure to sunlight					
Yes	93	31.0	270	90.0	**<0.001****
No	207	69.0	30	10	
Having foods rich in vitamin D					
Yes	111	37.0	210	70.0	**<0.001****
No	186	63.0	90	30.0	
Taking vitamin D supplements					
Yes	78	26.0	180	60.0	**<0.001****
No	222	74.0	120	40.0	
Doing exercise regularly (n=300)					
Yes	105	35.0	195	65.0	**<0.001****
No	195	65.0	105	35.0	

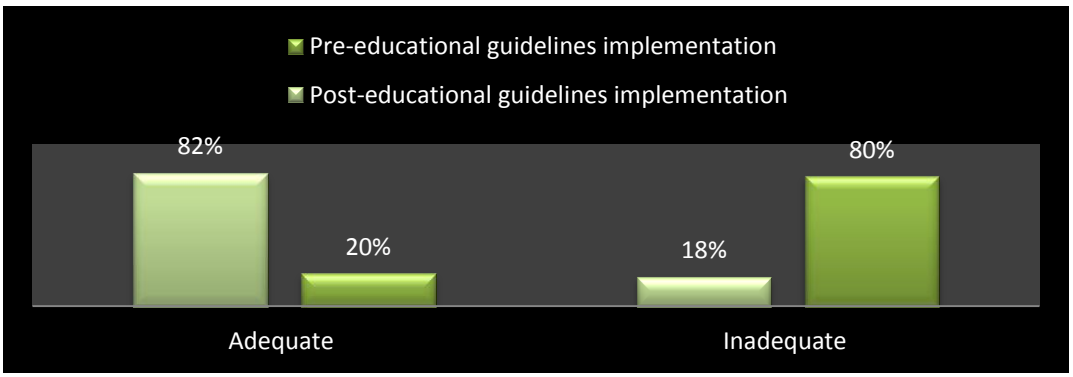

Figure (4): Premenopausal women's total practice level regarding vitamin D deficiency pre and post-educational guidelines (n=300).

Table (5): Correlation between knowledge and attitude; practice among the studied premenopausal women regarding vitamin D deficiency

Items	r value* (95% CI)	P –value
Knowledge – Attitude	0.874	<0.001
Knowledge – Practice	0.669	<0.001
Attitude – Practice	0.675	<0.001

*. Correlation is significant at the 0.05 level

Discussion:

Throughout one's life, vitamin D is necessary for optimal health. But those most susceptible to vitamin D deficiency are women and children. While the evidence supporting the relationship between vitamin D status and health and disease status is mounting, public health initiatives such as food fortification and supplementation are not always appropriate and have proven difficult to conduct. Combating vitamin D deficiency requires a combination of behavioral modifications and health education **(Zareef & Jackson, 2021)**.Vitamin D deficiency has been consistently linked to major chronic and non-communicable diseases such as diabetes and cardiovascular disease to name a few and as such, correction of vitamin D status has been encouraged as a preventive and adjuvant management in various disorders (**Al-Daghri et al., 2022).** Hence, The current study aimed to evaluate the impact of educational guidelines on **premenopausal** women's knowledge, attitude, and practice regarding Vitamin D deficiency.

Concerning the source of information among the studied premenopausal women regarding Vitamin D deficiency, the current study illustrated that three-fifths of the studied premenopausal women reported that they received their knowledge from healthcare providers. From the researcher's point of view, it confirmed that the studied premenopausal women seek the right services. This outcome was not matched with a study by **O'Connor et al., (2018)** who conducted a study about "Knowledge, attitudes and perceptions towards vitamin D in a UK adult population" and displayed that the most common source of vitamin D deficiency information was the internet. This result might be due to the internet easyto access at any time.

Also, this finding disagreement with a study by **Al-ghraibawi et al., (2019**) who studied knowledge and practices regarding vitamin D deficiency among perimenopausal women attending Imam Hussein Medical City in karbala and showed that the most common source of vitamin D deficiency information was the relatives and friends. In contrast, **Alnadwi et al., (2021)** conducted a study about " assessment of the knowledge regarding vitamin D deficiency among female adults attending the primary health clinic at Makkah, Saudi Arabia Saudi Arabian in 2019 " and reported that doctors were the main source of knowledge of vitamin D deficiency, while the internet is the lowest percentage.

As regards the studied premenopausal women's knowledge regarding vitamin D deficiency, the current study illustrated that there was a highly significant difference and improvement between all items of knowledge and premenopausal women had higher knowledge scores in all knowledge items post-educatiōnal guidelines implementation than pre-guidelines implementation. From the researcher's point of view, it reflected the positive effects of educational guidelines implementation which help in improving the sample; knowledge.

The reading aligned with the research conducted by **Shaheen et al. (2021**) under the title "Changes in maternal knowledge regarding vitamin D and its health importance after application of an educational program". According to **Al-ghraibawi et al. (2019**), the participants in their assessment of "knowledge and practices regarding vitamin D deficiency among women in Karbala" were unaware of the causes of vitamin D deficiency.

The current study agrees with **Khayyatzadeh et al., (2019)** who studied

"What is the best solution to manage vitamin D deficiency?" and found that most of the studied sample knew about to treatment of vitamin D deficiency, risk factorsof vitamin D deficiency, and symptoms of vitamin D deficiency. This finding was consistent with a study conducted in Saudi Arabia by **Alwadei et al., (2018)** that aimed to assess the awareness of the public regarding vitamin D deficiency and revealed that the majority of the studied sample had correct knowledge regarding vitamin D deficiency.

Along the same line, a study conducted by **Blebil et al., (2019)** aimed to assess the level of awareness and knowledge of vitamin D deficiency and investigate the factors associated with the level of awareness such as the knowledge of vitamin D sources, benefits and stated that more than half of studied samples had correct knowledge regarding vitamin D deficiency. Inconsistent with **Zareef & Jackson, 2021** who conducted a study about Knowledge and attitudes about vitamin D and sunlight exposure in premenopausal women living in Jeddah, and their relationship with serum vitamin D levels and reported that the studied samples expressed the feeling of having insufficient knowledge regarding vitamin D sources.

Regarding total knowledge scores about vitamin D deficiency, the current study findings revealed that three-quarters of the studied premenopausal women had good total knowledgescores, while ten percent of them had poor levels post-educational guidelines implementation. In the researcher's opinion, it reflected the success of the study's aim and the value of implementing educational guidelines that result in improvements in knowledge. This finding is in line with a study by **Alhothali et al., (2019)** who assessed the knowledge regarding vitamin D deficiency among women attending the clinic at Makkah, Saudi Arabia Saudi Arabian and illustrated that less than two-thirds of the studied sample had adequate knowledge about vitamin deficiency D.

The current study's findings portrayed that there were statistically significant differences and improvements in premenopausal women's total attitude pre and post-educational guidelines implementation. Also, this demonstrated the effectiveness of educational guidelines implementation that is connected to knowledge improvement and reflected well on their attitudes. this matched with **Jamil et al., (2019)** who conducted a study about " Knowledge, attitude, and practice related to vitamin D and its relationship with vitamin D status among Malay female office workers" and reported that most of the studied females had positive response towards vitamin D deficiency causes osteoporosis, which is one of the most serious bone diseases as a result of its deficiency. Moreover, this finding is supported by a study by **Juanid et al., (2019)** who studied "Knowledge, attitude and practice of medical students regarding vitamin D" and represented that I am exposed to the sun to reduce the incidence of osteoporosis.

The findings of the present study revealed that less than one-third of them had a positive attitude level regarding vitamin D deficiency pre-educational guidelines implementation which improved to be among more than two-thirds post-educational guidelines implementation. According to the researcher, this demonstrated the significance of providing educational guidelines implementation for the studied sample to improve their attitude. This finding is in line with a study by **Özel et al., (2020)** who conducted a study about " Vitamin D Knowledge, Attitudes, and Behaviors in Young Danish Women with a Non-Western Ethnic Minority Background—A Questionnaire Survey" and reported that most of the studied sample had a positive attitude toward Vitamin D deficiency. This might be due to that the premenopausal women under the study perceived themselves at risk, suggesting that they were more careful in sustaining health and preventing diseases resulting from vitamin D deficiency. On the other hand, this finding disagrees with **Blebil et al., (2019)** who explored the awareness, knowledge, attitude, and practices regarding Vitamin D among the general public in Malaysia and reported that most of the studied sample had negative attitudes toward Vitamin D.

The results of this study showed that there were statistically significant differences between the pre-and post-test total scores of vitamin D practices among premenopausal women. From the researcher's point of view, this validated the beneficial effects of providing instructional guidelines. It also reaffirmed the significance of implementing instructional guidelines that enhance knowledge related to better practices.

The current study illustrated that there was a significant correlation between knowledge and attitude; knowledge and practice; and attitude and practice, this result might be due to improving the level of knowledge having a direct influence on their attitude. This result is supported by a study by **Jamil et al., (2019)** who conducted a study about " Knowledge,attitude, and practice related to vitamin D and itsrelationship with vitamin D status among Malayfemale office workers" and showed that there were a positive correlation between the studied samples' level of knowledge regarding vitamin D deficiency, attitude and their level practice regarding vitamin D deficiency. This is because knowledge always corrects misconceptions and misbelieves. Also, this finding is in the same line with a study carried out by **Benhusein & Abdelmola, (2018)** who conducted a study about awareness of vitamin D deficiency among Tripoli University students in Libya who stated that there was a high positive correlation between knowledge, attitude, and their practice related vitamin D deficiency.

Worldwide research has indicated that vitamin D deficiency can also be caused by inadequate nutrition knowledge and the significance of micronutrients for general health, in addition to dietary consumption and sun exposure. According to surveys conducted in Saudi Arabia, knowledge is deficient regarding the production and consumption of vitamin D **(Aljefree et al., 2019).**

Effective intervention programs that combine several strategies, such as fortifying food with vitamin D, supplementing risk groups with vitamin D, and raising public awareness, should be a part of public health policies to combat this. However for public awareness campaigns to be effective, several questions must currently be addressed **(Kotta et al., 2020).**

For instance, how much do people know about food fortification, supplements, and sources of vitamin D? What are the general opinions about sun exposure and how it affects the level of vitamin D? Do opinions change with age? More research is necessary because there is a dearth of information about these issues that is pertinent to the general public, particularly to young women. It has been suggested that a significant portion of the populace is ignorant of vitamin D deficiency and nutrition; however, these findings are limited because the survey was conducted among a small sample of students who are educated members of society **(Christie et al., 2019).**

Conclusion:

Based on the findings of the current study, it was concluded that the educational guidelines had a positive effect on improving premenopausal women's knowledge, attitude, and practice regarding vitamin D deficiency. There were statistically significant improvements in knowledge, attitudes, and practice among premenopausal women pre & post-training educational guidelines. Regarding vitamin D deficiency, there was a positive correlation between the studied sample's total knowledge score, total attitude, and total practice.

Recommendation:

Based on the findings of this study, the study recommended the following:

- Create a premenopausal education program to raise women's awareness of the importance of screening for vitamin D deficiency.

- There is a need for creating simple Arabic printed educational materials such as (booklets, pamphlets, and posters) regarding

vitamin D deficiency that can improve Knowledge, attitudes, and practice among premenopausal women.

- Replication of the current study with a larger sample in different settings is required to generalize the results.

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.p- ISSN: 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 women, Archives of Public Health,79:224, P.p. 12.

Al-Daghri, N. M., Alfadul, H., Kattak, M. N. K.,& Yakout, S. (2022). Vitamin D and its influence in circulating trace minerals among Arab adults with or without adequate vitamin D levels. Journal of King Saud University- Science, 34(4), 102012.

AlFaris N., AlKehayez N., AlMushawah F., AlNaeem 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-Shaban S. & Al-Zubaida R., (2019): Knowledge and practices regarding vitamin D deficiency among women attending Imam Hussein Medical City in Karbala, International Journal of Current Pharmaceutical Research ISSN- 0975-7066 11 (6): 39-43.

Alhothali, S., Alharbi, N. M., Almagnoni, A. S., Alnadwi, W. B. K., Alharbi, N. M. S., & Almasri, R. H. S. (2019). Assessment of the knowledge regarding vitamin D deficiencyamong female adults attending the primary health clinic at Makkah, Saudi Arabia Saudi Arabia in 2019: a cross-sectional study. European Journal of Molecular & Clinical Medicine (EJMCM), 6(01).

Aljefree N., Lee P. & Ahmed F., (2019): Knowledge and attitudes about vitamin D, and behaviors related to vitamin D in adults with and without coronary heart disease in Saudi Arabia, BMC Public Health, 17:266.

Alnadwi, W. B. K., Alharbi, N. M. S., Almasri, R. H. S., Jalal, S. A. M., & Almahmudi, M. A. O. (2021). Assessment of the knowledge regarding vitamin D deficiency among female adults attending the primary health clinic at Makkah, Saudi Arabia in 2019: a cross-sectional study. European Journal of Molecular & Clinical Medicine, 6(1), 139-149.

Alwadei A., Al-Johani N., AlZamanan S., Alwadei A. & Hassanein M., (2018): Public Awareness of Vitamin " D " Deficiency among Children in Najran City and The Role of Primary Health Care Centers in Raising Their Awareness, The Egyptian Journal of Hospital Medicine; Vol. 70 (12: 2100-2109.

Benhusein & Abdelmola, (2018). AWARENESS OF VİTAMİN D DEFİCİENCY AMONG TRIPOLI UNIVERSITY STUDENTS IN LIBYA *Benhusein GM, Abdelmola ML, Panacea Journal of Pharmacy and Pharmaceutical Sciences, 2018:7(4) 01-14.

Blebil, A. Q., Dujaili, J. A., Teoh, E., Wong, P. S., & Bhuvan, K. C. (2019). Assessment of awareness, knowledge, attitude, and the practice of vitamin D among the general public in Malaysia. Journal of Karnali Academy of Health Sciences, 2(3), 171-180.

Botros R., Al Sebaeiy H., Mansour H. & Guirgis M., (2019): High prevalence of severe vitamin D deficiency in Egyptian females, Endocrine Abstracts, Vol. 63, P 473, DOI: 10.1530/endoabs.63.P473.

Christie, F., & Mason, L. (2019). Knowledge, attitude, and practice regarding vitamin D deficiency among female students in Saudi Arabia: a qualitative exploration. Int J Rheum Dis;14:22–9.

Giustina, A. Adler, R., and Binkley, N. (2019): Controversies in Vitamin D: Summary Statement From an International Conference. J Clin Endocrinol Metab; 104:234.

Hashem R., Abed Elhafez H. & Abed Elwahed R., (2020): Effect of Counseling about Vitamin D Deficiency Among Women in Abo-teg Health Center, Assiut Scientific Nursing Journal, Vol. , (8) No., (23) December, P.p. (205-216).

Helen Shaji John Cecily. (2016): Community & Public Health Nursing. Role of Health Nursein Prevention and Early Detection of Vitamin D Deficiency among Women.J Comm Pub Health Nursing 2: e109.

Huang, F., Liu, Q., Zhang, Q., Wan, Z., Hu, L., Xu, R.,... & Wang, L. (2020). Sex-specific association between serum vitamin D status and lipid profiles: a cross-sectional study of a middle-aged and elderly chinese population. Journal of Nutritional Science and Vitaminology, 66(2), 105-113.

Ibrahima R., & Abd El-Maksoud M., (2018): Effect of educational programs on knowledge and self-management of patients with chronic obstructive pulmonary disease, Egyptian Nursing Journal, P.p. 15:246-257.

Jamil, N. A., Shahudin, N. N., Abdul Aziz, N. S., Jia Qi, C., Wan Aminuddin, W. A. A., Mat Ludin, A. F.,... & Mat Daud, N. (2019). Knowledge, attitude, and practice related to vitamin D and its relationship with vitamin D status among Malay female office workers. International journal of environmental research and public health, 16(23), 4735.

Juanid, R., Feroz, S., & Mughal, A. (2019). Knowledge, attitude, and practice of medical students regarding vitamin D. Journal of Rawalpindi Medical College, 23(S-2).

Khayyatzadeh, S. S., Bagherniya, M., Abdollahi, Z., Ferns, G. A., & Ghayour-Mobarhan, M. (2019). What is the best solution to manage vitamin D deficiency? IUBMB life, 71(9), 1190-1191.

Kotta, S., Gadhvi, D., Jakeways, N., Saeed, M., Sohanpal, R., Hull, S., Famakin, O., & Grifths, C. (2020). "Test me and treat me" attitudes to vitamin D deficiency and supplementation: a qualitative study. BMJ Open;5:e007401.

Kumari, A & Kumari, V. (2019). The Study of Vitamin D deficiency in Peri and Postmenopausal Women of Jamshedpur, Jharkhand. Vol.5; Issue: 12; ISSN (Online):2393-915X; (Print): 2454-7379**.**

Maheshwari, R. U., Lathab, J. L & Sampson, R. U. (2020). Quality of Life and Vitamin D Status in Premenopausal Women. International Journal of Research and Review. Vol.7; Issue: 1; E-ISSN: 2349-9788; P-ISSN: 2454-2237**.**

Manandhar P., Manandhar N. & Joshi S.,(2020): Knowledge, Attitude, and Practice about Vitamin D among Women at a Municipality of Bhaktapur, J Nepal Med Assoc.;58(232):1036-40.

Mangaiyarkarasi R., Kumudhavalli D. & Karthi R., (2021): A study to Assess the Effectiveness of Structured Teaching Programme on Knowledge and Attitude Regarding Vitamin A Deficiency and Its Prophylaxis among Mothers of Under Five Children at the Selected village at Tamilnadu; International Journal of Research and Review DOI: https://doi.org/10.52403/ijrr.20210932 Vol.8; Issue: 9; Website: www.ijrrjournal.com.

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), [Epub Ahead of Print]. 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/VitaminD-HealthProfessional/

O'Connor, C., Glatt, D., White, L., & RevueltaIniesta, R. (2018). Knowledge, attitudes, and perceptions towards vitamin D in a UK adult population: a cross-sectional study. International journal of environmental research and public health, 15(11), 2387.

Özel, E., Cantarero-Arevalo, L., & Jacobsen, R. (2020). Vitamin D Knowledge, Attitudes, and Behaviors in Young Danish Women with a Non-Western Ethnic Minority Background—A Questionnaire Survey. International journal of environmental research and public health, 17(21), 8053.

Parisa A., Golaleh A., Hoda S., Mehrdad K., Atieh A., Parvin M.., & Fereidoun A.(2017) Psychometric Properties of a Developed Questionnaire to Assess Knowledge, Attitude and Practice Regarding Vitamin D (D-KAP- 38). Journal of Nutrients, 9(5), 471.

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.

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.

The National Council for Women 2018: "Vitamin D"... A woman's lifeline from depression and bone pain. http://gate.ahram.org.eg/News/2012427.aspx, September 2018.

The North American Menopause Society.(2020): Promoting women's health at midlife and beyond. https://www.menopause.org/for women/menopauseflashes/menopause-symptoms-and-treatments/menopause-101 a-primer-for-the-perimenopausal.

Zareef T. & Jackson R., (2021): Knowledge and attitudes about vitamin D and sunlight exposure in premenopausal women living in Jeddah, and their relationship with serum vitamin D levels, J Health [Epub Ahead of Print]. https://doi.org/10.1186/s12877-021-02719-4.