Mothers' Awareness regarding Vitamin D Deficiency among Their Infants in Kalyobia Governorate

Walaa Kamal kamel, Demonstrator of Community Health Nursing, Faculty of Nursing, Benha University, ***Howida Sadek Abd El-Hamid,*** Professor of Community Health Nursing, Faculty of Nursing, Benha University ***Hanaa Abd El- Gawaad Abd El-Megeed,*** Professor of Community Health Nursing, Faculty of Nursing, Benha University and ***Hedya Fathy Mohy El-Deen,*** Lecturer of Community Health Nursing, Faculty of Nursing, Benha University.

Abstract

Vitamin D deficiency is a worldwide problem that is largely unknown by majority of population and its prevalence is high even in developed and sunny countries. ***The purpose of the study*** was to assess mothers' awareness regarding vitamin D deficiency among their infants in Kalyobia Governorate. ***Design:*** Descriptive correlational research design was utilized in this study. ***Setting:*** This study was conducted at 4 Health Care Centers in Kalyobia Governorate :Benha 1, Toukh, Bahtem 1 and Begam Health Care Center. ***Subject:*** Purposive sample was used in this study; the total sample included 362 mothers. ***Instruments of data collection: I):*** An interviewing questionnaire which consists of three parts to assess ***a):*** Social characteristics ***b):*** Knowledge about vitamin D and its deficiency and, ***c):*** Practices regarding prevention of vitamin D deficiency, ***II):*** Scale to measure attitude about importance of vitamin D and its supplementation. ***Results:*** Regarding mothers' knowledge, 56.9% of the mothers had poor knowledge, 76.8% of mothers had unsatisfactory practices regarding prevention of vitamin D deficiency, and 64.4% of the mothers had positive attitude regarding importance of vitamin D and its supplementation. ***Conclusion:*** There was a highly statistically significant relation between total knowledge score of mothers and their age, educational level, occupation, monthly income, and residence. There was a positive statistically significant correlation between total knowledge score, total attitude score and total practice score about vitamin D deficiency. ***Recommendations:*** All health care professionals are encouraged to educate mothers the importance of vitamin D and the consequences of its deficiency through health educational program during postnatal or well-baby visits to assure healthy population.

Key words: **Awareness, Infants, Vitamin D deficiency.**

Introduction

Vitamin D is a fat-soluble vitamin that plays an important role in bone health which encourages the absorption and metabolism of calcium and phosphorous. As a very active research area, many of the physiologic effects of vitamin D in both mineral metabolism and extra-skeletal effects have already been covered ***(Verkaik-Kloosterman et al., 2017).*** Vitamin D plays important roles in cell differentiation, growth, preventing cancer cells from dividing, preventing cardiovascular disease and has anti-

inflammatory properties. Vitamin D is involved in the regulation of insulin formation and secretion, which suggests a role in blood sugar maintenance and the development of diabetes mellitus ***(Verkaik-Kloosterman et al., 2017).*** During the last decade, no other micronutrient has gained and sustained massive interest in the fields of health and biomedical research community as much as vitamins ***(Al-Daghri et al., 2017).***

Vitamin D may come from three sources: Ultra-Violet Beta (UV-B) radiation from the sun, vitamin D supplements and nutritional sources. 90% of all needed vitamin D has to be photosynthesized in the skin through UV-B radiation. Vitamin D supplementation should be introduced from the first day of life with 400 International Units (IU)/ day to all infants. Foods naturally have vitamin D: Fatty fish such as salmon, tuna, and mackerel are the best sources, Beef liver, cheese, egg yolks, cod liver oil, milk and its products, and Mushrooms provide some vitamin D. Less than 10% of vitamin D is obtained from dietary sources ***(National Institute of Health, 2017).***

Observational epidemiological studies carried out during the last two decades, have provided compelling evidence that low vitamin D status is associated with increased risk of a wide range of diseases including neuropathy, malignancy, infertility, cardiovascular, kidney diseases, glucose metabolism, immunological dysfunctions, acute respiratory infection, and fractures. In infants, serious vitamin D deficiency leads to rickets ***(Scragg, 2017).***

Vitamin D Deficiency (VDD) leads to abnormal calcium homeostasis resulting in defective mineralization of the growing long bones called rickets in children ***(Ranjan et al., 2016).*** Rickets is an example of extreme VDD, with a peak incidence between 3 and 18 months of age. A state of deficiency occurs months before rickets is obvious on physical examination, and the deficiency state may also be present with hypocalcemic seizures, growth failure, lethargy, irritability, and a predisposition to respiratory infections during infancy ***(Perlstein, 2016).***

Community health nurses play an important role in the prevention of VDD through health education. Community health nurses should take urgent steps through motivation and to create awareness about VDD. Health education raising mothers' awareness about vitamin D, its importance to health and wellbeing, the consequences of its deficiency and practices to prevent VDD. Community health nurses could educate mothers about sources of vitamin D and importance of sun exposure because it is not possible to obtain an adequate amount of vitamin D from dietary sources alone. Therefore, a combination of sun exposure along with adequate vitamin D supplementation for all children will prevent vitamin D deficiency/insufficiency ***(Ferri, 2016***).

Significance of the problem:

More than 254 million children suffer from vitamin deficiency worldwide in each year. Estimates of about one billion people worldwide are reportedly suffering from vitamin D deficiency and it is a widespread problem ***(Alshahrani, 2014).***Vitamin D inadequacy is now an internationally recognized health problem. Worldwide, one in seven people (14%) are estimated to have either insufficient or deficient vitamin D status, whilst in healthy children, the prevalence ranges from 14% to 49% ***(Iniesta et al., 2016).*** And 68% in Saudi Arabia and 52% in Pakistan ***(Al Marzooqi et al., 2016).*** 66% in India ***(Kavitha et al., 2015).*** Although sun exposure is considered a major source of vitamin D, the prevalence of its deficiency is paradoxically much higher in the countries with sunny climate, such as Saudi Arabia, Egypt, Oman, United Arab Emirates and Jordan ***(Elshafie et al., 2012).***

Vitamin D deficiency is global problem, and its prevalence is high even in developed and sunny countries. The prevalence of vitamin D insufficiency is increasing globally ***(Aly & Abdel-Hady, 2015).*** Nutritional rickets still exists in a number of countries in the Middle East like Egypt. Egypt, a country where the sun is shining all the year, has still a high prevalence of vitamin D deficiency rickets ***(Mahmoud, 2016***).

Methods

Purpose of the study: The purpose of the study was to assess mothers' awareness regarding vitamin D deficiency among their infants in Kalyobia Governorat.

Research Questions:-

1- Is there an associative relationship between characteristics of mothers and their knowledge about vitamin D deficiency?

2- Is there a relationship between knowledge and practices of mothers to prevent vitamin D deficiency and their attitudes about vitamin D supplementation?

Research design

A descriptive correlational research design was utilized to conduct this study.

Setting:-

This study was conducted at 4 Health Care Centers in Kalyobia Governorate. These centers were selected by cluster random sample, one center randomly selected from each directory of the Kalyobia Governorate. Benha 1, Toukh ,Bahtem 1 and Begam Health Care Center were selected from north, west, east and south directions respectively. These centers were characterized by high attendance rate by mothers.

Subjects:

Sampling type:-

A Purposive sample of the mothers attended the previous mentioned settings matching the following criteria: mothers' children's age is from one month to 12 months, infants free from any chronic diseases, and mothers accepted to be involved in the study.

Sampling size:-

Sample size was calculated using the following formula

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

Where 'n' is sample size.

'N' is total number of all mothers attended to previously mentioned setting in the last six months at 2016

N=3910

'e' is Coefficient factor = 0.05

Sample size is = 362

Instruments

Two instruments were used for data collection:

Instrument one:

A structured interviewing questionnaire: It was developed by the investigator based on reviewing related literatures; it was written in simple clear Arabic language and revised by the supervisors of this study to assess:

A- **First part:** It was concerned with characteristics of studied sample. This part included three items. Infants' characteristics such as gender, age and weight at birth. Characteristics of mothers such as age, current marital status, educational level, occupation and monthly income. Housing conditions such as residence, housing type, the source of lighting during the day, ventilation, and entering the sun to the house.

Second part: It was concerned with mothers' knowledge related to two main areas: 1-vitamin D and its deficiency 2-nutritional rickets

Scoring system:

The scoring system for mother's knowledge was calculated as follows (2) score for complete answer, while (1) score for incomplete answer, and (0) for wrong or don't know answer. For each area of knowledge, the score of the items was summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a present score. The total knowledge score was considered good if the score of the total knowledge ≥75 %, while considered average if it is equal to 50 - < 75%, and considered poor if it is < 50%.

Third part: It was concerned with reported practices of mothers regarding prevention of vitamin D deficiency which was divided into three parts: Feeding, Vitamin D supplements and sun exposure

Scoring system:

The scoring system for mother's practices was calculated as 1 score for done, while 0 for not done. The score of the items was summed-up and the total divided by the number of the items, giving a mean score for each part. These scores were converted into a present score.

The total practices score was considered satisfactory if the score of the total practices > 60%, while considered unsatisfactory if it was ≤ 60%.

Instrument two:

A Likert type scale was used to measure attitudes of mothers about importance of vitamin D and vitamin D supplementation. It was adapted from Rezaei et al., (2014) - Kavitha et al., (2015) - Al Marzooqi et al., (2016) .each statement was assessed by 3 points (Agree, Uncertain and Disagree). It

was translated into Arabic by the investigator

Scoring system:

Attitude scale score was calculated as 2 scores for agree, 1 scores for uncertain and (0) for disagree.

The total attitude score was considered positive if the score ≥75 %, while considered neutral if it equals 50- <75%, and considered negative if it is <50%.

Instructional guideline:

Illustrated booklet guideline was distributed between mothers, it contain knoweledege about vitamin D deficiency(meaning, importance, sources of vitamin D, meaning of vitamin D deficiency, diseases caused by vitamin D deficiency, meaning of rickets, causes, risk factors, signs and symptoms, diagnosis, treatment, prevention of vitamin D deficiency and rickets).

Content Validity of the instrument:

The instrument validity was done by nine Staff Nursing experts from Community Health Nursing Specialties and Pediatric Nursing Specialties of Benha, Ain shams and Menoufia University who reviewed the instruments for clarity, relevance, comprehensiveness, and applicability, some modifications were done.

***Reliability of the instrument*:**

Applied by the internal consistency of instruments were checked by test – retest reliability. Reliability was tested using chi - square test. It was estimated 90.01 for instrument one and .87for instrument two.

Ethical consideration:

The agreements for participation of the subjects were taken after the purpose of the study was explained to them. Before data collection, the subjects were informed about the purpose, nature of the study and what would be done with the results. They were given the opportunity to refuse to participate. They were informed that they can withdraw at any stage of the research. Also, they were assured that the information would remain confidential and would only be used for the research purpose. The investigator emphasized that participation in the study was entirely voluntary and the anonymity of the mothers were assured through data coding. Oral consent form was signed by the participants before their participation in the study.

Pilot study

The pilot study was carried out on (36) mother which represented 10% of the sample size. The aim of the pilot study was to assess the tool clarity, applicability and time needed to fill each sheet, completing the sheet consumed about 15-20 minutes. No modifications were done, so the pilot study sample was included in the total sample.

Procedure

Before data collection, the purpose of the study was explained to the administrative personnel, an official request for permission of data collection was obtained by submitting a letter from the Dean of the Faculty of Nursing, Benha University to the administrator of health directory in Benha to inform the directors of selected Health Centers to facilitate the investigator's work during data collection and allow her to meet the mothers at previously mentioned settings.

The data was collected from mothers who attended in the previous selected centers through interview with them. The study was conducted at a period of 6 months which starting from the beginning of July 2017 to the end of December 2017. The investigator attended two days/ week in each of the Health Centers from 9.00 am. to 12 pm. These days were Saturday and Wednesday to collect data with distributed instruction guideline about vitamin D deficiency to prevent it and improve health. The average number of interviewed mothers/ day was between 6-8 mothers. Each interview lasted from 15 to20 minutes to fill the sheet depending upon their understandings and responses.

IV. Statistical Analysis:-

Data entry and statistical analysis were done using the statistical package for social sciences (SPSS version 20). Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, mean and standard deviation for quantitative variables.

Qualitative variables were compared using the chi - square test and correlation coefficient to measure the direction and strength of the correlation between variables. A statistical significant difference was considered if P was <0.05. A very highly statistical significant difference was considered if P was <0.001

Results

Table (1): Distribution of infants' according to their characteristics (n=362).

Infants' characteristics	No.	%
Gender		
Male	189	52.2
Female	173	47.8
Age / months		
<6	148	40.9
≥6	214	59.1
X ±SD	5.9±3.36	X ±SD
Weight at birth / k.g		
<2.5	53	14.6
2.5 -	226	62.4
3 -	79	21.8
4 -	4	1.1

Table 1 shows that 52.2 % of infants were males, and 59.1% of them aged from 6 to 12 months. Regarding infants' weight at time of birth, 62.4% of them ranged from 2.5 kg to 3 kg.

Table (2): Distribution of mothers according to their characteristics (n=362).

Socio-demographic characteristics	No.	%
Age / years		
20 -	89	24.6
25 -	145	40.1
30 -	100	27.6
35 -	28	7.7
Current marital status		
Married	342	94.5
Widow	0	0.00
Divorced	20	5.5
Educational level		
Unable to read and write	24	6.6
Preparatory education	57	15.7
Secondary education	141	39.0
University education	123	34.0
Postgraduate	17	4.7
Occupation		
Housewife	230	63.5
Employee	112	30.9
Free work	20	5.5
Monthly income		
Enough and save	71	19.6
Just enough	225	62.2
Not sufficient	66	18.2

Table 2 shows that 40.1 % of mothers aged 25 years or more, 94.5% of them were married, 39.0% of them had secondary education, 63.5 % of them were housewives and 62.2% of them had enough family income per month.

Table (3): Distribution of mothers according to their housing condition, from their point of view (n=362).

Housing condition	No.	%
Residence		
Urban	148	40.9
Rural	214	59.1
Housing type		
Separate	238	65.7
Sharing	124	34.3
The source of lighting during the day		
Natural (sunlight) through windows	103	28.5
Electricity	80	22.1
Both sources	179	49.4
Ventilation		
Adequate	352	97.2
Not adequate	10	2.8
Entering the sun to the home		
Yes	268	74.0
No	94	26.0

Table 3 describes that 59.1 % of mothers were living in rural areas, 65.7% of them were living in a separate house, and 49.4% of them had electricity and enough sunlight during the day, 97.2 % of them had adequate ventilation. 74.0% of them, the sun enter their houses.

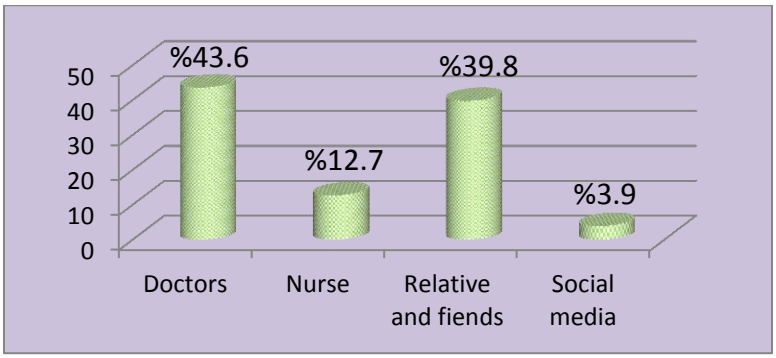

Figure (1): Distribution of mothers according to their sources of information.

This figure shows that 43.6 % of mothers acquired their knowledege about vitamin D and its deficiency from doctors and only 3.9 % of them from social media.

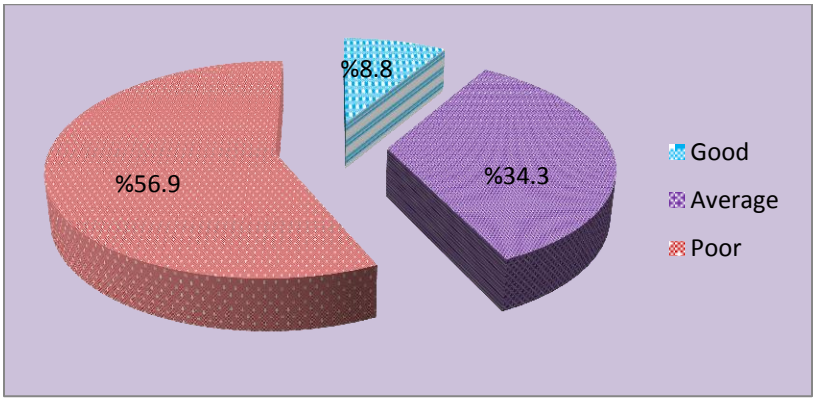

Figure (2): Distribution of mothers according to their total knowledge score about vitamin D and its deficiency (n=362).

Figure 2 illustrates that only 8.8% of the mothers had good knowledge about vitamin D and its deficiency. However 56.9 % of them had poor knowledge about vitamin D and its deficiency.

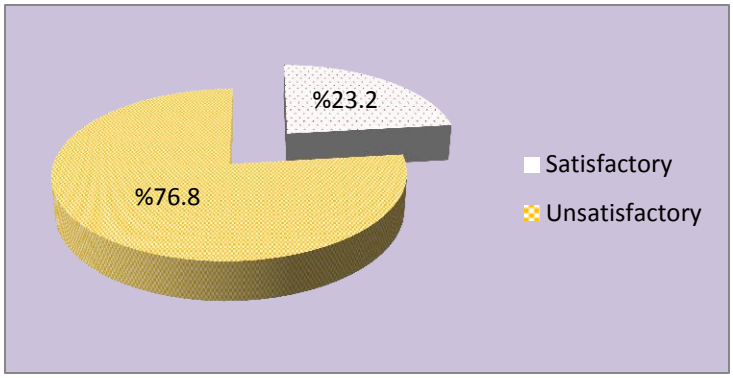

Figure (3): Distribution of mothers according to their total practices score through asking questions (n=362).

Figure 3 reveals that; 23.2% of mothers had satisfactory practices regarding prevention of vitamin D deficiency. However, 76.8% of them had unsatisfactory practices regarding prevention of vitamin D deficiency.

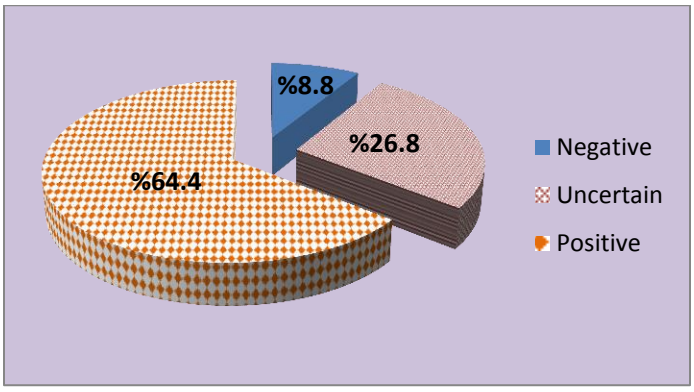

Figure (4): Distribution of mothers according to their total attitude score towards the importance of vitamin D and its supplementation (n=362).

Figure 4 reveals that 64.4% of mothers had positive attitude regarding the importance of vitamin D and its supplementation, while 8.8 % of them had negative attitude regarding the importance of vitamin D and its supplementation.

Table (4): Associative relation between studied mothers' social characteristics and their total knowledge score about vitamin D and its deficiency

Social characteristics	Total knowledge score						x2	p-value
	Poor		Average		Good			
	No.	%	No.	%	No.	%		
Age / years								
20 -	65	31.6	24	19.4	0	0.0	59.59	< 0.001**
25 -	67	32.5	46	37.1	32	100.0		
30 -	56	27.2	44	35.5	0	0.0		
35 -	18	8.7	10	8.1	0	0.0		
Current marital status								
Married	200	79.1	114	85.5	28	87.5	5.54	0.23
Divorced	6	15.0	10	8.1	4	12.5		
Educational level								
Unable to read and write	24	11.7	0	0.0	0	0.0	173.11	< 0.001**
Preparatory education	53	25.7	4	3.2	0	0.0		
Secondary education	87	42.2	54	43.5	0	0.0		
University education	41	19.9	62	50.0	20	62.5		
Postgraduate	1	0.5	4	3.2	12	37.5		
Occupation								
Housewife	166	80.6	64	51.6	0	0.0	108.73	< 0.001**
Employee	28	13.6	52	41.9	32	100.0		
Free work	12	5.8	8	6.5	0	0.0		
Monthly Income								
Enough and save	11	5.3	44	35.5	16	50.0	85.09	< 0.001**
Just enough	135	65.5	74	59.7	16	50.0		
Not sufficient	60	29.1	6	4.8	0	0.0		
Residence								
Urban	62	30.1	62	50.0	24	75.0	29.59	< 0.001**
Rural	144	69.9	62	50.0	8	25.0		

****Highly significant P ≤ 0.001** ***Significant P ≤ 0.05**

Table 4 reveals that; there was a highly statistical significant associative relation between the total knowledge score and mothers who had the highest level of knowledge ranged from 25-<30 years , married, having secondary education, employee and living in urban residence . There was no significant relationship between total knowledge score of mothers and their current marital status.

Table (5): Correlation between mothers' total knowledge, practices and attitude score regarding vitamin D deficiency.

Items	Total knowledge score	
	r	p-value
Total practices score	0.42	0.025*
Total attitude score	0.61	< 0.001**

****Highly significant P ≤ 0.001**
***Significant P ≤ 0.**

Table 5 reveals that there was a positive statistical significant correlation between total knowledge score and total attitude score at 5% level statistical significance. Also, there was a highly statistical positive correlation between total attitude score and total knowledge score at 1% level of statistical significance.

Discussion

Vitamin D plays a physiological role in maintaining the extracellular calcium ion levels in the body by controlling its absorption from the intestine. Vitamin D plays an essential role in various metabolic processes and neuromuscular activities such as cell differentiation, growth, preventing cancer cells from dividing, preventing cardiovascular disease, has anti-inflammatory properties and regulates insulin formation **(Malaeb et al., 2017)** .Vitamin D deficiency is a major cause of rickets in infants. More recently, the link between vitamin D deficiency and impaired immunity, inflammatory response, types of cancer, diabetes, cardiovascular diseases, respiratory diseases and hypertension has been emphasized **(Zhang et al., 2016).**

Most of the studied sample had adequate ventilation and less than three quarters of them; the sun enter their houses. This might be due to slightly less than three fifths of mothers lived in rural areas where there was enough distance between houses which helped in sun entry into their houses.

Regarding percentage distribution of mothers, according to their sources of information, the present study revealed that less than half of mothers gained their information about vitamin D and its deficiency from doctors (figure 1). This was supported by **Babelghaith et al., (2017),** they studied knowledge and practice of vitamin D deficiency among people living in Riyadh, Saudi Arabia-A cross-sectional study (N=496), they found that approximately two fifths of studied sample had the source of information from Health Care Professionals.

Concerning the total knowledge score of mothers regarding vitamin D and its deficiency, the results of the current study revealed that more than half of mothers had poor knowledge about vitamin D and its deficiency (figure 2). This finding was in agreement with **Kotta et al., (2015),** they studied attitudes to

vitamin D deficiency and supplementation: a qualitative study, East London, (N=58), they found that limited knowledge in all groups interviewed. However this finding was incongruent with **Çiçek et al., (2015),** they studied the determination of the level of knowledge and attitudes of mothers regarding vitamin D use in Konya, (N=100),they found that the majority of mothers had adequate knowledge regarding vitamin D deficiency. This might be due to less accessibility to medical services in rural areas and they didn't see doctors only if there was a problem in their infants and most doctors did not have enough time to discuss with mothers.

Concerning total practice score of mothers related to the prevention of vitamin D deficiency, the result of the present study showed that three quarters of mothers had unsatisfactory practices regarding prevention of vitamin D deficiency (figure 3). This finding was in agreement with **Kavitha et al., (2015),** they studied knowledge, attitude and practice regarding vitamin D deficiency among antenatal mothers in Tamilnadu: a phenomenological study in India, (N=86), they found that the majority of the study participants had poor practices for prevention of vitamin D deficiency. This might be due to their poor knowledge.

Regarding to total attitude score of mothers related to importance of vitamin D and its supplementation, the current study revealed that more than three fifths of mothers had positive attitude regarding importance of vitamin D and its supplementation (figure 4). This was in the same line with **Çataklı et al., (2014),** they studied knowledge and practice of mothers regarding vitamin D supplementation admitted to a hospital, Ankara, Turkey, (N=476), they reported that the attitude of almost two thirds of the mothers regarding vitamin D importance is favorable.

The present study revealed that there was a highly statistically significant relation between total knowledge score of mothers and their age and educational level (table 4). This finding was in agreement with **Nayana and Umarani (2014),** they made planned teaching program, to creates awareness regarding prevention of vitamin-D and calcium deficiency in children in India, (N=100), they reported that there was association between knowledge score and age respectively educational level. This might be due to the aging and education affect their acquiring of knowledge.

The results of the present study showed that there was statistically significant correlation between total knowledge score and total practice score about prevention of vitamin D (table 5). This was in agreement with **Habib et al., (2014),** they studied vitamin D deficiency: knowledge and practice among adult Saudi females, (N=310), they found that there was a positive association between the total knowledge score and the total practice score. This might be due to knowledge play important role for changing behavior leading to change of practices. The increase in total knowledge

was associated with an increase in the total practice score.

The current study showed that there was a highly statistically significant correlation between total knowledge score and total attitude score (table 5) this was consistent with **Al marzooqi et al., (2016),** they studied knowledge, attitude & practice of vitamin D supplementation status among six months old infants in Abu Dhabi Island,(N=245), they found that a positive relation between attitude score and knowledge score with r= .26, P <.001 was obtained. Also the current study was supported by **Nooijer et al., (2010),** they studied vitamin D supplementation in young children associations with theory of planned behavior variables, descriptive norms, moral norms and habits in the Netherlands,(N=270), they reported that there was association between attitude score and practice score of parents.

Conclusion

More than half of mothers had poor knowledge about vitamin D and its deficiency, three quarters of mothers had unsatisfactory practices regarding prevention of vitamin D deficiency while more than three fifths of mothers had positive attitude regarding importance of vitamin D and its supplementation. There were highly statistically significant relations between total knowledge score of mothers and their age, educational level, occupation, monthly income, and residence. There was a positive statistically significant correlation between total knowledge score, total attitude score and total practice score about vitamin D deficiency.

Recommendations

1. Health educational program should be developed and implemented for mothers to educate them about the importance of vitamin D and the consequences of its deficiency during postnatal or well-baby visits to assure healthy population.
2. Booklets should be available and distributed in all health care centers to all mothers about the disease and health-related practices.
3. A routine postnatal prescription of vitamin D supplements should be given to all newborns and all health insurances are encouraged to cover the costs.
4. Further studies need to be focusing on the associations between vitamin D and health.

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