IMPACT OF KNOWLEDGE REGARDING VITAMIN D DEFICIENCY AMONG FEMALE ADULT ATTENDING THE PRIMARY HEALTH CLINIC AT MAKKAH, SAUDI ARABIA, 2022

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Abstract

Background :

Vitamin D plays a very important role in the human body. In Saudi Arabia, the sun exposure is limited for many reasons. The use of vitamin D-fortified food or supplements may complement the daily body requirements. The knowledge and perception of the general population towards vitamin D-fortified intake in Makkah, Saudi Arabia, are not known. Saudi Arabia has one of the highest reported incidences of vitamin D deficiency in studies conducted worldwide. However, there has been very limited exploration of vitamin D related knowledge, attitudes and practices among female adult in Saudi Arabia. However, the case of vitamin deficiency is reported to increase in many female Saudi Arabia worldwide, especially in Saudi Arabia. Mothers, having adequate knowledge about vitamin D and its supplementation, may lead to possible lowering of the cases of vitamin D deficiency and its complications.

Ami of the study: To assessment the impact of Knowledge regarding Vitamin D deficiency among female adult attending the Primary Health clinic at Makkah, Saudi Arabia, 2022.

Methods: This was an analytical cross-sectional study conducted during 2022, among female adult attending the Primary Health clinic at Makkah AL-Mokarramah random sampling technique was applied and an Arabic self-administered questionnaire used for data collection.

Result: shows that most of the participants (37.0%) were in the age 25-30 years also regarding level of education the majority of participant are Secondary education were(34.0%). Regarding Marital status the majority of participant are married were (58.0%). Regarding the Economic level the majority of participant Average were (45.0%). Regarding the Chronic disease the majority of participant No were (72.0%).

Conclusion: The low levels of knowledge about vitamin D and low consumption of vitamin despite the population in the current study having a moderate level of knowledge about vitamin D-fortified food, the practices towards intake of vitamin D-fortified food or supplements are still underused.

Supplementation, including vitamin D, calcium, multivitamin, and calcium supplements with vitamin D, may have contributed to the higher prevalence of vitamin D deficiency among the female adult.

Keywords: Assessment, Knowledge, Vitamin D, deficiency, adult, attending, Primary Health clinic, Makkah

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Introduction

Further studies using a qualitative approach are crucial to explore the underlying reasons for low knowledge about vitamin D and behaviours related to vitamin D including the intake of vitamin supplementation that may contribute to the high burden of vitamin D deficiency in the country. [1]Vitamin D is a fat-soluble vitamin that plays very important body functions. Vitamin D is essential for maintaining metabolic processes and skeletal health by regulating calcium and phosphate metabolism [2]. In addition, it has a vital role in immunity, insulin secretion, cell proliferation, differentiation, and apoptosis [3]. Vitamin D-fortified foods may help maintain the vitamin D status of the general population [4]. The recommended daily vitamin D intake is about 10–20 μg (400-800 IU) [5]. However, adequate vitamin D intake is unlikely to be attained through dietary means, particularly in the groups at the highest risk [7]. In general, the body gets most of its vitamin D via epidermal synthesis (80-100%) [8]. Fish, particularly those with high fat content, such as sardines, salmon, herring, and mackerel, are rich in vitamin D. Meat, milk, eggs, and fortified food like margarine are other important animal sources of vitamin D [9]. The guidelines recommend early screening of vitamin D serum levels for the general population and rapid correction of vitamin D deficiency with vitamin D supplements [10]. Prevalence rates of severe vitamin D deficiency, defined as estimates of the prevalence of 25(OH)D levels <50 nmol/L (or 20 ng/ml), have been reported in as much as 42% in the United States, 25% in Canada, and 13% in Europe [11]. Many countries across the world also reported a very high prevalence of low vitamin D status, defined as levels below 30 nmol/L (or 12 ng/ml) in >20% of the population. Such prevalence has been reported in India, Tunisia, Pakistan, and Afghanistan [12].

Several studies have focused on the biological factors that cause vitamin D deficiency around the world; however, few studies have examined the effects of cultural and lifestyle behaviour's, knowledge and beliefs that influence vitamin D status [13]. Recently, we conducted a study using a quantitative approach to examine knowledge and attitudes about, and behaviour's toward, vitamin D in subjects with and without CHD in Saudi Arabia [14]. The results showed that low levels of knowledge about vitamin D and low consumption of vitamin supplements, including multivitamins and vitamin D supplements, were associated with vitamin D deficiency [15]

Literature Review

Tariq et al. BMC Public Health (2020) Despite this female adult having access to the internet and health information, knowledge about vitamin D was quite poor. Poor knowledge could be due to conflicting information available about vitamin D and lack of clear localised messages about sun exposure .[16]

Similar limitations to the knowledge of vitamin D have been reported in studies across Bangladesh, the Middle East, Iran, Lebanon and also among immigrants from South Asian countries living across Europe. Similar to our study, most studies have found their participants not able to identify sources of vitamin D in food and sunlight as critical enabler in vitamin D production [17, 18]

However, results are in contrast to those reported in the UK where the participants did demonstrate good level of knowledge about vitamin D [19]. This perhaps is indicative of the increased public awareness and food fortification practices in the developed world. Multi-prong strategies are required to appraise public knowledge and awareness about vitamin D.

Study findings demonstrated that vitamin D deficiency was significantly more prevalent in the female /+adult than the controls. Previous studies have reported similar results [20, 21]

[22] Reported that People should receive information, in local languages, that reflects the actual state of knowledge regarding vitamin D and its association with health, along with clear information on vitamin D sources [22]. These national public health messages should be relayed across various platforms (i.e., social media, health centres, universities, schools), especially through the media, to increase awareness among all sub-groups of the population [23]. The traditional knowledge, attitudes, and practice (KAP) survey theory suggests a direct linear relationship between knowledge, attitudes, and behaviors, which is, according to several studies, very simple and not true . This is because people's behaviors have a multifactorial nature and depend on many factors such as socio-cultural and environmental factors, not just knowledge and attitudes[24]. Further it is important to recognise awareness regarding the causes and prevention of vitamin D deficiency as an avenue to be explored by the public health offices, which should begin by conducting conclusive studies to determine general public knowledge regarding this pertinent issue [22]

A study among older adults in Netherlands has reported similar results as the higher levels of knowledge about vitamin D was associated with higher vitamin D serum levels [27]

Food Fortification Programme (FFP) in KSA is exploring the food fortification of staple foods like milk, vegetable oil and wheat with vitamin D [25] This is in alignment with evidence that suggests universal vitamin D food fortification can improve serum 25-hydroxyvitamin D levels [22]. However, to encourage public adaptation, it is important to address any public concerns about food fortification, which have been reported to exist especially among South Asians [12].

Rational:
Vitamin D deficiency is widespread in Saudi Arabia However, there has been very limited exploration of vitamin D related knowledge, attitudes and practices among female adult in Saudi Arabia. Vitamin D is known to have essential roles in the human body. However, the case of vitamin deficiency is reported to increase in many female Saudi Arabia worldwide, especially in Saudi Arabia. Mothers, having adequate knowledge about vitamin D and its supplementation, may lead to possible lowering of the cases of vitamin D deficiency and its complications. The researcher has an interest in vitamin D in female adult PHCCs are the appropriate location for study the when the researcher was working in the PHCC, she noticed that a lot of mothers who came for vaccinating their children have no idea or proper information about the vitamin D and a lot of mother's consultations about vitamin D

Ami of the study: To assessment Knowledge regarding Vitamin D deficiency among female adult attending the Primary Health clinic at Makkah, Saudi Arabia, 2022

Objectives:
To assessment Knowledge regarding Vitamin D deficiency among female adult attending the Primary Health clinic at Makkah, Saudi Arabia, 2022

Methodology
Study Design: Cross-sectional analytical study.
Study Population: female adult attending the Primary Health clinic at Makkah, Saudi Arabia, 2022

Eligibility Criteria:
Inclusion Criteria
- Female gender.
- All nationalities.
- Mothers attended PHCCs in Makkah Al-Mokarramah.

Exclusion Criteria
- Illiterates mothers.
- Mothers can't speak Arabic language.

Study Area:
Makkah Al-Mokarramah is the holy city for all Muslims. It is the place where the Prophet Muhammad (peace be upon him), was born, and where the message of God was first revealed to him and where the presence of Almasjid Alharam (the holy mosque) which contains Alkaa'ba representing the Qibla, the guidance for all Muslims in their prayers.
Makkah Al-Mokarramah is located in the western region in an area called Makkah region and contains 85 PHCC which divided under seven PHCC sectors (13 PHCC under Aladel sector, 11 PHCC under Alkakiah sector, 13 PHCC under Asharaie sector, 14 PHCC under Azzaher sector, 10 PHCC under Kheles sector, 11 PHCC under Alkamel sector and 13 PHCC under Aljamoom sector).
There are several services in the PHCC in Makkah Al-Mokarramah including family medicine clinics, general clinics, chronic disease clinics, antenatal clinics, dental clinics, well baby clinics and vaccination clinics, as well as pharmacy, radiology and laboratory services. Family medicine clinics run by certified specialists and consultants while the other remaining clinics run by the general practitioners.
Total population in Makkah Al-Mokarramah city in the last statistics at 2020 is 2,578,722 according to General Authority of Statistic (GAS) in the Kingdom of Saudi Arabia (KSA).

Sample Size:
According to the GAS of KSA, the total population in Makkah Al-Mokarramah city in 2022 is 2,578,722. According to statistics of Ministry of Health (MOH), the percentage of the children who are their age is 0-5 years is 8.4%, then accordingly the total population of this study calculated and it was 194,143.
The sample size was calculated by Raosoft online website, based on the following assumptions: the total population was 194,143, the prevalence of knowledge about weaning was 50%, confidence Interval was 95%, and error margin was 5%. Accordingly, the estimated sample size was (**200**). It was 384 + 38.4 (10%) for non-responders = 422.4 and by approximation it became (**200)**.

Sampling Technique:
All areas of Makkah Al-Mokarramah city and its environs is divided under seven sectors of PHCCs

were legible residents registered by Directorate General of Health Affairs in Makkah Al-Mokarramah region. From each sector, one PHCC (Stratified) was randomly selected to represent its equivalent portion (1/7) in the study sample, then simple randomization was adopted on numbers using online random number generator, to select one PHCC from the list of all names specific to each sector .Systematic random sampling technique was used to invite 55, 67, 65, 65, 50, 65 and 55 mothers from Aliskan PHCC, Azzaher PHCC, Asharaie PHCC, Alawali PHCC, Um Algerm PHCC, Hada Alsham PHCC, and Alkamel PHCC, respectively to participate in the study.

The total eligible mothers attended the randomly selected PHCCs By dividing the total eligible mothers per day to the required sample (30/10 = 3), therefore, every third eligible mother was invited to participate in the study. The second eligible mother was selected by simple random as a starting point, and then every third mother (2nd, 5th, 8th, 11th …..etc.) were invited. In the case of refusing to participate in the study the next eligible mother was invited, and then the selection was continued in the same interval of every third eligible mother.

Data Collection Tool:

An Arabic self-administered questionnaire was used for collecting the data. The questionnaire modified and translated from a validated english interview schedule. The questionnaire collected data on written consent for participation, socio-demographic details, previous information about the weaning and its source, the knowledge about weaning (e.g. age of introduction of solid food, amount, and types of solid food), as well as the weaning practice (e.g. when the solid food began, which amount and types of food used).

Data Collection Technique:

After getting all needed permissions, the researcher assigned one week for each randomly selected PHCC and the required sample divided into five portions to be collected through five days. The researcher took place in the reception of the PHCC beside the receptionist, and when the patients came to take a paper for getting a service in the PHCC, the mothers with the eligible criteria was invited to participate in the study by asking three questions (do you have a 5-years child or younger, can you read and write and verbal consent for participation). At first, the second eligible mother was selected by simple random as a starting point, and then every third mother (2^{nd}, 5^{th}, 8^{th}, 11^{th} …..etc.) were invited. In the case of refusing to participate in the study the next eligible mother was invited, and then the selection was continued in the same interval of every third eligible mother.

An arabic, self-administered questionnaire was distributed to the invited mothers with a pen to fill the questionnaire while they were sitting in the waiting area before getting the service. The mothers took 5-10 minutes to fulfill the questionnaire, and after they finished, they placed the questionnaire in a small basket presented in a table in the waiting area as requested by the researcher. When the researcher noticed that, she came to collect the filled questionnaire and thank each mother for her participation and gave her a brochure about proper weaning process and its importance and risks of inappropriate weaning with a candy for her and her child if accompanied by her.

Data Entry and Analysis:

All collected data verified by hand, then coded before its entry to a personal computer. Statistical Package for the Social Sciences (SPSS) version 24 used for data entry and analysis. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative categorical variables, and means and standard deviations for quantitative variables. Analytic statistics using the association between two variables were applied. P-value less than 0.05 was considered statistically significant.

Pilot Study:

The pilot study conducted on 10% of the sample size with similar characteristics as the study's sample, but who were not included in the final sample using the similar questionnaire. The sample of the pilot chosen by non-probability convenient sampling technique in Al-Eskan PHCC which included under Al-Kaakiah PHCC sector in Makkah Al-Mokarramah . It aims to test the feasibility of the study, the clarity of the questionnaire and estimating the time needed to fill it. Important suggestions, omissions, and corrections from the results of the pilot study were incorporated in the final questionnaire and therefore enhanced its reliability.

Ethical Considérations:

- Approval from the research committee was obtained.
- Approval from Makkah joint program of family and community medicine was obtained.
- Approval from General Administration of Research and Studies, MOH, KSA.
- Approval from the Directorate General of Health Affairs of Makkah Al-Mokarramah,

public health, and PHCC affairs sector was obtained.
- Written consent from each participant in the study was obtained for data collection.
- All information kept confidential.
- The researcher acknowledged the supervisor, advisors, helpers, facilitators, participants and family members.
- Brochure about weaning practice was provided for each participant in the study.

Budget:
The study was self-funded.

Results

Table 1 Distribution of demographic data(age, gender, social, Smoking , HYN duration ,Occupation) in our study(n=200)

	N	**%**
Age		
<25	56	28
25-30	74	37
30-35	38	19
>35	32	16
Level of education		
Primary	24	12
Intermediate	56	28
Secondary	66	33
High education	54	27
Marital status		
Married	170	85
Unmarried	30	15
Economic level		
Low	74	37
Average	90	45
High	36	18
Chronic disease		
Yes	56	28
No	144	72

Table 1 shows that most of the participants (37.0%) were in the age 25-30 years also regarding level of education the majority of participant are Secondary education were(34.0%). regarding Marital status the majority of participant are married were(58.0%). Regarding the Economic level the majority of participant Average were(45.0%). Regarding the Chronic disease the majority of participant No. were(72.0%).

Table 2. Distribution of the Knowledge towards Vitamin D of the studied population

	N	**%**
Knowledge on sources of vitamin D		
Fruits & vegetables	84	42
Water	12	6
Mushroom	22	11
Fatty fish	32	16
Vitamin D supplements	28	14
Sun	68	34

Air	4	2
Selected cereals	34	17
Milk/Diary	40	20
Nuts	44	22
Cod-liver oil	18	9
Chicken	8	4
Egg	38	19
Beef	6	3
Don't know	74	37
Exposed to sun		
Yes	178	89
No	22	11
Sun exposure time		
Below 30 min	74	37
30 min above	40	20
More than 1 hours	68	34
Not exposed	18	9
Wearing full sleeved shirt /pant		
Yes	24	12
No	176	88
Covering of arms while working		
Yes	18	9
No	182	91
Wearing cap/umbrella		
Yes	40	20
No	160	80
Use of cosmetic cream contain SPF more than 8		
Yes	66	33
No	134	67
Use of sunscreen lotion		
Yes	18	9
No	182	91
Frequency of use cosmetic cream		
Once a day	48	24
Twice a day	40	20
More than 2	6	3
Not using	194	97
Duration of use		
1-5 years	38	19
6-10 years	22	11
Above 10 years	36	18
No	164	82

Table 2 shows Knowledge towards Vitamin D regarding the Knowledge towards Vitamin D the most of participant Fruits & vegetables were (42.0%) followed by Don't know were (37.0%), regarding Exposed to sun the majority of participant answer Yes were (89.0%) ,but regarding Sun exposure time the most of participant Below 30 min while regarding Wearing full sleeved shirt /pant the most of participant answer No were (88.0%), regarding the Covering of arms while the most of participant answer No were(91.0%). Regarding the Wearing cap/umbrella the most of participant answer No were (80.0%), regarding the Use of cosmetic cream contain SPF more than 8 the most of participant answer No were (67.0%), regarding the Use of sunscreen lotion the most of participant answer No were (91.0%), regarding the Frequency of use cosmetic cream the most of participant Not using were (97.0%), regarding the Duration of use the most of participant No were (82.0%)

Table 3. Distribution of the Knowledge towards Vitamin D of the studied population

	N	%
Knowledge on time needed in sun to get adequate vitamin D		
Less than 30 min	18	9
More than 30 min	34	17
More than 1hr	148	74
Knowledge of the adult women about the Benefits of vitamin D		
Bone health	52	26
Immune health	24	12
Prevents Rickets	38	19
Vision	30	15
Pregnancy & breast feeding	44	22
Hair growth	26	13
Diabetes mellitus	16	8
Cardiovascular health	12	6
Cognitive health	14	7
Cancer prevention	30	15
Cancer prevention	58	29
Calcium absorption	22	11
Prevent osteoporosis	16	8
Knowledge on factors affecting vitamin D level among adult women		
Skin pigment	38	19
Cloud & shade	22	11
Time of the day	38	19
Latitude	6	3
Season	24	12
Age	40	20
Pregnancy/ lactation	38	19
Fatty diet	12	6
Sunscreen use	22	11
Vegetarian diet	16	8
Diary allergy	18	9
Pollution	24	12
Wind	18	9
Smoking	20	10
BMI	36	18

Table 3 shows Knowledge on time needed in sun to get adequate vitamin D the most of participant More than 1hr were (74.0%), regarding Knowledge of the adult women about the Benefits of vitamin D answer Cancer prevention were (29.0%) ,but Knowledge on factors affecting vitamin D level among adult women the most of participant Pregnancy/ lactation were (20.0%),

Table 4: Distribution of the Knowledge regarding Vitamin D deficiency among female adult Makkah Al-Mokarramah, 2021

Knowledge		
	N	**%**
Weak	98	49
Average	66	33
High	36	18
Total	200	100

Chi-square	**X^2**	28.84
	P-value	<0.001*

Table 4 shown, the results of the Vitamin D deficiency Knowledge a significant Weak relation were (98.0%) while p=0.001 and X^2 28.84.

Figure 1 Distribution of the Knowledge regarding Vitamin D deficiency among female adult Makkah Al-Mokarramah, 2021

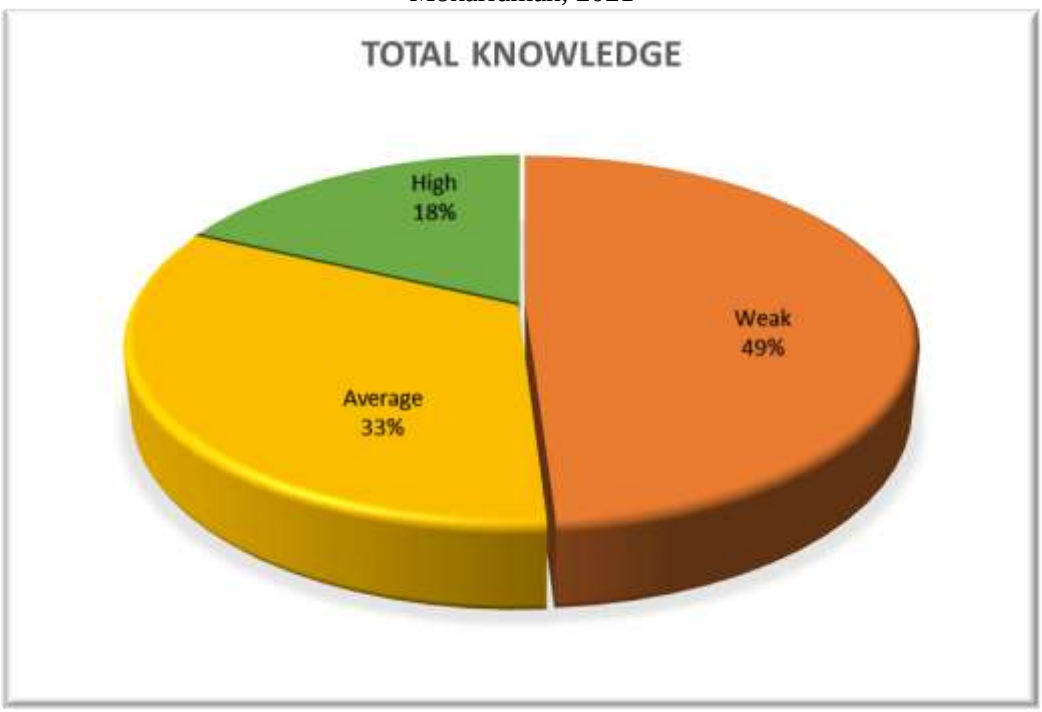
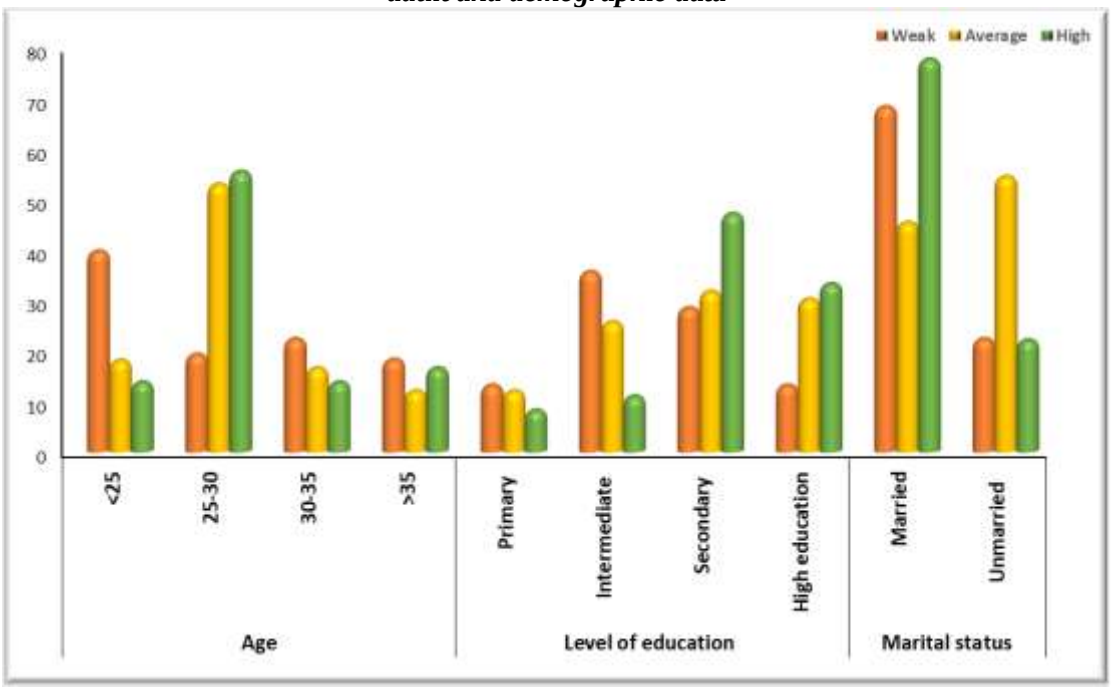


Table (5) distribution of the relation of the Knowledge regarding Vitamin D deficiency among female adult and demographic data

			Weak		**Average**		**High**		**Chi-square**	
			98		**66**		**36**			
		N	**N**	**%**	**N**	**%**	**N**	**%**	**X^2**	**P-value**
Age	<25	56	39	39.80	12	18.18	5	13.89	28.124	0.0001
	25-30	74	19	19.39	35	53.03	20	55.56		
	30-35	38	22	22.45	11	16.67	5	13.89		
	>35	32	18	18.37	8	12.12	6	16.67		
Level of education	Primary	24	13	13.27	8	12.12	3	8.33	16.037	0.0136
	Intermediate	56	35	35.71	17	25.76	4	11.11		
	Secondary	66	28	28.57	21	31.82	17	47.22		
	High education	54	13	13.27	20	30.30	12	33.33		
Marital status	Married	170	67	68.37	30	45.45	28	77.78	140.896	<0.001*
	Unmarried	30	22	22.45	36	54.55	8	22.22		

Table 5show the relation of the Knowledge regarding Vitamin D deficiency among female adult and demographic data regarding age a significant relation were P-value=0.0001 and X^2 5.920 in average and high, regarding Level of education no significant relation were P-value=0.0136 and X^2 16.037in average . regarding Marital status a significant relation were P-value=0.001 and X^2 140.896 in average

Figure (2) ***distribution of the relation of the Knowledge regarding Vitamin D deficiency among female adult and demographic data***



Conclusion

Health education interventions that increase awareness about vitamin D sources, especially food sources, are made. Also, educational interventions should focus on increasing awareness about the sufficient time of the day and duration for sun exposure to improve vitamin D status and the importance of the intake of vitamin D supplements as an affordable source to improve vitamin D status. Increasing males' awareness of the benefits of vitamin D is important to encourage them to adopt behaviors to improve vitamin D.

Discussion

In this study, the level and knowledge on vitamin D and adherence to supplementation of the female adult attending the Primary Health clinic at Makkah, Saudi Arabia, 2021. Results revealed that majority of the mothers under study thought that vitamin D is important for the health of their the female adult, however large percentage of them had limited information about vitamin deficiency. Similarly, the work of Hoel and colleagues (25), Babelghaith and co-workers (26), Alamoudi and others (27) in Saudi Arabia showed that the participants under their studies exhibited limited knowledge when it comes to Vitamin D and its deficiency. Al-Saleh and others (28) mentioned that possible reasons for the said deficiency can be the insufficient knowledge about vitamin D, suggesting an increase in public awareness, especially to mothers, to be promoted to manage the increasing prevalence of Vitamin D deficiency and avoid its further complications. Contrary to the result of current study, a similar cross-sectional study in Majmaah City, Saudi Arabia reported that majority (80.5%) of the participants were aware about vitamin D (29)

In this study, family is the major reported source (60.0%) of information concerning Vitamin D, followed by doctor (20.0%) and media (20.0%). Other studies in Saudi Arabia indicated the primary source of the Vitamin D knowledge of respondents as media (29), Doctor (20) and health care professionals (21). However, this value is two-fold lower than the reported overall knowledge mean score of 5.9 ± 1.2 of the participants in the study of Alamoudi and colleagues (17) in Jeddah, Saudi Arabia.

Regarding adherence to vitamin D supplementation, majority of the respondents was found to not adhere to vitamin D supplementation. In other Arab country, Alotaibi and co-workers (19) also reported that majority (74.8%) of the participants in their study did not take vitamin D supplements. Comparable results were also seen to other published non-Arab works wherein a percentage ranging from 2 to 19% of breastfeeding infants were reported to be under vitamin D supplementation (22, 23). Contrary to the result of current study, 90% have received vitamin D supplementation in the prospective cohort study of pregnant women and their children (24)

The low percentage of adherence to Vitamin D of the mothers under study can possibly be due to their poor knowledge on vitamin D and its deficiency.

Doctors and family doctors allied health care providers have significant roles in advising or educating parents to practice supplementation for their female adult.

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