

Awareness of Vitamin D Deficiency Among Type 2 Diabetes Mellitus Saudi Adults in Saudi Arabia

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ABSTRACT

Objectives: To assess the level of awareness of vitamin D deficiency among T2DM Saudi Adults in Saudi Arabia.

Background: Vitamin D (25 hydroxyvitamin) has been linked to the association with developing or worsening a lot of chronic diseases, one of the most important is diabetes mellitus.

Methods: This is a cross sectional study that aims to assess the level of awareness of vitamin d deficiency among T2DM in Saudi adults in Saudi Arabia and to estimate the percentage of T2DM in Saudi adults taking vitamin D supplements. vitamin D deficiency awareness was assessed in a sample of 316 Saudi National, aged above 18, both genders and having type 2 diabetes using an electronic survey sent by social media "WhatsApp".

Results: The results showed that 96.4% of females and 96.9% of males have heard about vitamin D, and 44.6% from participants have heard about vitamin D from healthcare professionals, 28.5% from media, and only 26.9% from relatives and friends. The study aimed to evaluate the knowledge, and as the results showed a variable knowledge between males and females. We found most of the males are depending on the sun exposure for vitamin D, while females

were depending on vitamin D supplements, while a small group of the sample has no idea about the sources.

Conclusion: Regarding to the results we found that diabetic patient with type 2 need to their awareness and improve their health. They should be advised from their doctors about it and start a prophylactic doses of vitamin D.

Keywords: Vitamin D, Deficiency, Diabetes, Awareness, Riyadh.


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INTRODUCTION

25-hydroxyvitamin D deficiency is defined as less than 20ng/ml (<50nmol) and its deficiency is associated with developing or worsening a lot of chronic diseases, one of the most important is diabetes mellitus.¹ Many types of researches suggest that vitamin D may play a role in insulin resistance; the role of vitamin D is regulation of calcium absorption and bone metabolism. In addition, vitamin D deficiency has risk factors such as obesity, aging, lifestyle and low physical activity and many metabolic syndromes including type 2 diabetes. Low serum 25-hydroxyvitamin D (25(OH)D) has been shown to correlate with increased risk of type 2 diabetes. Small, observational studies suggest an action for vitamin D in improving insulin sensitivity and/or insulin secretion.² There is some evidence that there are physiological interactions between vitamin D, IGF-1, and its binding proteins IGFBP-1 and IGFBP-3. Variations in circulating IGF-1 and its binding proteins are associated with variations in glycaemia and may interact with vitamin D status to influence metabolic syndrome risk. It also becomes clear that polymorphisms in the VDR gene may be

associated with insulin resistance, insulin secretion, and fasting glucose concentrations, suggesting that vitamin D is likely to contribute to glucose metabolism.³ The prevalence of vitamin D deficiency in patients with diabetes and pre-diabetes is high. As the treatment of vitamin D deficiency is cheap and safe, it may be an effective method of preventing diabetes. Some cross-sectional and epidemiological studies have shown the role of vitamin D deficiency in increasing the incidence of diabetes, but the results of interventional studies with vitamin D on insulin sensitivity were inconstant.⁴ However, despite being vitamin D deficiency a common presentation as a lot of researches conducted in Saudi Arabia stated, a lot of people in our population may not know about this relation and the importance of maintaining a normal vitamin D level in our bodies in which its deficiency can result in worsening or developing a lot of complication. Hence, the aim of our study is to assess the level of awareness about vitamin D deficiency among type 2 diabetes patients and to estimate the percentage of patients who take supplementation in Saudi Arabia.

LITERATURE REVIEW

A prospective, cross sectional study was done at the Security Forces Hospital in Riyadh, Saudi Arabia, 2011. Aim of the study was to examine the awareness, knowledge, and attitudes regarding vitamin D and its sources among Saudi Arabian children. A 200 children participated in his study (one hundred were vitamin D deficient and one hundred were healthy children). Their age ranged from 2 to 17 years. Each participant was interviewed regarding awareness, knowledge, and attitudes to vitamin D using short-answer questions and multiple-choice questions. In children <10 years interviews were done with the parents. Results showed that 50% of the patients and 70% of the healthy children had knowledge of vitamin D and its health implications. Most participants were able to mention other source of vitamin D. Only 68.75% of the patients, compared to 88.8% of the healthy children, named the sun as a source of vitamin D. 28% of the patients were aware of the sources of vitamin D, and 64% of the healthy subjects were also aware of the sources.⁵

A cross sectional study was carried out in Riyadh, Saudi Arabia, in 2016. Aim of the study was to investigate the knowledge and practice about vitamin D deficiency among people who live in Riyadh, Saudi Arabia. An online questionnaire was used to collect data. Participants ages ranged from (18-60). Most participants (98.4%) have heard of vitamin D either from health care provider, friends or media. Regarding sun exposure only 46.4% of participants reported that they like being exposed to sunlight during the day. Majority of participants 93.1% know that vitamin D has an important role in bone health. 3.2% of participants do not know the sources of vitamin D, while 91% of them reported the sun as a main source of vitamin D. This study found that there is poor practice regarding sun exposure, inadequate knowledge toward vitamin D effects on other body systems. This study emphasized the importance of establishing a continued education programs to the public about vitamin D importance.⁶

A cross-sectional study was conducted among adults aged 20-40 years in Sharjah, UAE. Participants were selected from public places using convenience sampling method. They were subjected to a self-administered questionnaire. The majority of the adults demonstrated significant lack of knowledge and poor practices towards vitamin D and its deficiency. Therefore, attempts to increase the awareness about this issue are required through establishing educational campaigns targeting the general public in Sharjah, UAE.⁷

A cross-sectional study was carried out during the period from 1, March 2016 to 30, September 2016. A total of 439 subjects aged 20–45 years, attending five randomly selected primary healthcare centers were selected using a systemic random sampling procedure. Data were collected by personal interview using a pre-designed questionnaire. The majority (70.6%) of the participants had normal Vitamin D level, 24.8% had deficient level and 4.6% had insufficient level. The prevalence of diabetes mellitus among the studied population was 12.1%. Diabetes mellitus was more prevalent among cases of Vitamin D deficiency as it affects 16.3% of them and 10.3% of participants with normal Vitamin D level with statistically significant difference.⁸

Abulmoein E published on May 6 2016 a cross-sectional retrospective study about the awareness of vitamin D deficiency in Jeddah, Saudi Arabia. The aim of his study was to assess the awareness, perception, and understanding of vitamin D deficiency

among families living in Jeddah, Saudi Arabia .A total of 1752 parents of children aged from 2 to 18 were included. Samples were divided into two groups (746 were highly educated and 491 were low educated). The results showed that majority have heard about vitamin D, 82.9% fail to identify the best time for sun exposure. This study recommended improving health education about vitamin D among public population.⁹

A pre-designed questionnaire regarding the knowledge about vitamin D was administered by Yousef .S on 2015. Blood samples were collected and serum 25hydroxyvitamin D (25(OH)D was measured from a total of 1188 boys (15.1 ± 2.2 years) and 1038 girls (15.1 ± 2.0 years). The results showed that a high percentage of boys answered correctly than girls regarding the knowledge about sun exposure questions. The percentages of girls were significantly higher regarding vitamin D sources questions. Boys had a higher prevalence and frequency of sun exposure than girls. Vitamin D deficiency was significantly higher in girls than boys (47.0% versus 19.4.0%). They recommended that the awareness of vitamin D and sunlight exposure in children needs to be improved by provision of trained physicians and school teachers. Creating more areas where girls can uncover freely during routine works and outdoor activities will help increase their vitamin D levels.¹⁰

OBJECTIVES

1. To assess the level of awareness of vitamin D deficiency among T2DM Saudi Adults in Saudi Arabia.
2. To estimate the percentage of T2DM Saudi Adults taking vitamin D supplements.

METHODS

A cross-sectional study, it was carried out between July and November 2017. A total of 316 participated in the study. An invitation message will be sent to the participants using social media (via WhatsApp) to participate in this study with a link to the survey. They were asked about demographic variable such as age, gender, marital status and educational status was graded as Primary school/Intermediate school, high school and university, and detailed questionnaire was used to obtain basic data regarding awareness, knowledge, sources, health benefits and practice of sun exposure of vitamin D. Ethical approval was obtained from Al-Maarefa Colleges Research Committee.

Sample size for the study calculated based on estimating the awareness among a Canadian population.¹¹ Anticipating an awareness of 29% with an absolute precision of ± 5% and confidence level of 95%, the minimum sample size required for the study was observed to be, the minimum sample size required for this study will be 316.

Inclusion Criteria

Saudi National, aged above 18, both genders and having type 2 diabetes. Statistical analysis was coded for entry and analysis using SPSS Statistical Package for the Social Sciences (SPSS) version 24 software. The results were presented in tables as frequencies and percentages

RESULTS

Demographic Profile

According to table 1, it showed that statistically significant relationship between males and females in regards to age groups,

as 72.7% and 55.2% from females and males participants are having 25 to 59 years old, respectively. However, no relationship between them in regards to social status, as 85% from females and 90.6% from males are married. Results showed that 86.4% from females and 69.8% from males are not smokers (statistically

significant difference, with p value less than 0.05). Later, results showed 41.4% from females are having university degree, while the rest of them having high school degree and less. However, 58.3% from males are having university, and the rest was having high school and less.

Table 1: Participants demographic profile (n=316)

Parameter			Gender		Total	P-value
			Male	Female		
Age	18 to 25	Count	10	24	34	0.002
		% within Gender	10.4%	10.9%	10.8%	
	25 to 59	Count	53	160	213	
		% within Gender	55.2%	72.7%	67.4%	
	60 and above	Count	33	36	69	
		% within Gender	34.4%	16.4%	21.8%	
Social status	Single	Count	9	28	37	0.216
		% within Gender	9.4%	12.7%	11.7%	
	Married	Count	87	187	274	
		% within Gender	90.6%	85.0%	86.7%	
	Divorced	Count	0	5	5	
		% within Gender	0.0%	2.3%	1.6%	
Smoker	Yes	Count	29	30	59	0.001
		% within Gender	30.2%	13.6%	18.7%	
	No	Count	67	190	257	
		% within Gender	69.8%	86.4%	81.3%	
Education level	Primary school/ Intermediate school	Count	17	83	100	0.002
		% within Gender	17.7%	37.7%	31.6%	
	High school	Count	23	46	69	
		% within Gender	24.0%	20.9%	21.8%	
	University	Count	56	91	147	
		% within Gender	58.3%	41.4%	46.5%	

Table 2: Participants information about vitamin D (n=316)

Parameter			Gender		Total	P-value
			Male	Female		
Heard about Vitamin D	Yes	Count	93	212	305	0.820
		% within Gender	96.9%	96.4%	96.5%	
	No	Count	3	8	11	
		% within Gender	3.1%	3.6%	3.5%	

Table 3: Participants information about vitamin D (n=316)

Source of Information			Gender		Total	P-value
			Male	Female		
Health care professional	Count	44	92	136	0.686	
	% within Gender	47.3%	43.4%	44.6%		
Media	Count	27	60	87		
	% within Gender	29.0%	28.3%	28.5%		
Relatives and friends	Count	22	60	82		
	% within Gender	23.7%	28.3%	26.9%		

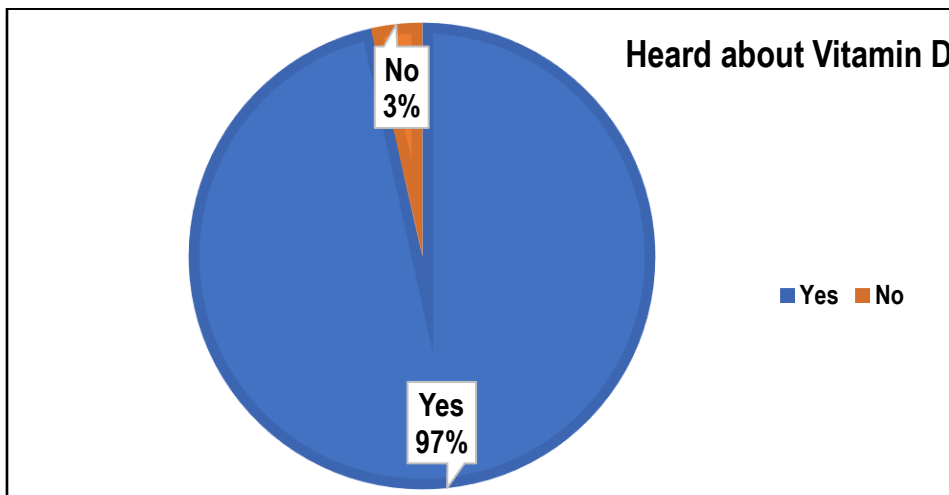


Fig 1: Prevalence of participants if heard about vitamin D (n=316)

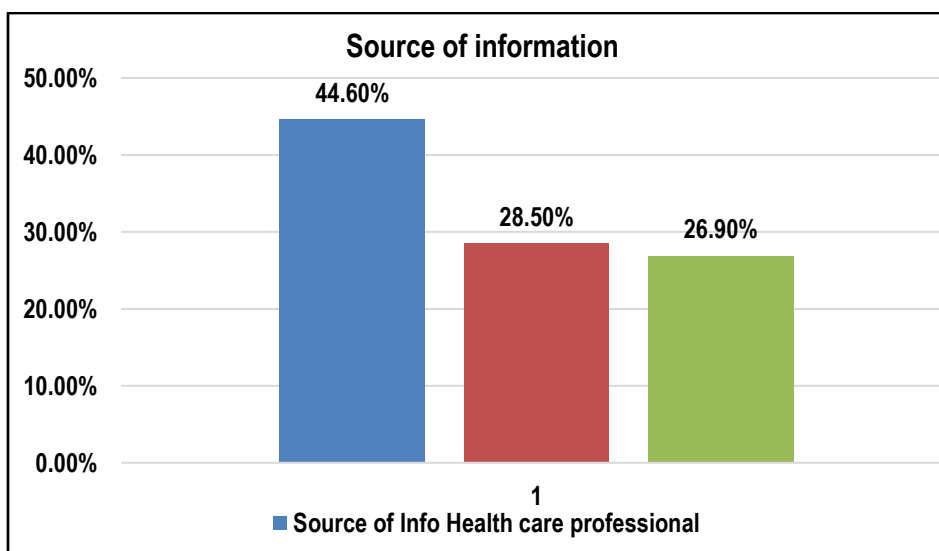


Figure 2: Source if information about vitamin D (n=316)

To assess the level of awareness of vitamin D deficiency among T2DM Saudi Adults in Saudi Arabia

To discover the awareness of vitamin D deficiency, table 2 showed that no relationship between males and females that if they heard or not about vitamin D (p value more than 0.05). However, 96.4% and 96.9% from females and males respectively heard about vitamin D.

To investigate the source of information about vitamin D, results showed that there was no statistically significant relationship between females and males in regards to the source of information. In more details, 44.6% from participants heard about vitamin D from healthcare professionals, 28.5% from media, and only 26.9% from relatives and friends.

The sun exposure profile investigated in table 4. Accordingly, no statistically significant relationship between genders towards there like going to sun exposure or not, and if use parasol to shade from sun. however, relationship between gender and sunscreen use, frequency of using sunscreen, and thoughts about exposure to sunlight if it enough or not.

In details, only 58.2% and 63.5% from females and males like being exposed to sun. However, 86.8% from females are not using parasol, and as well as 86.5% from males. To protect from sun, 74.5% from females are using sunscreen, and 92.7% from

males are using sunscreen with higher percentage. As well as, males are higher in frequency for using sunscreen less than 2 days per week with 89.6% and only 78.6% for females. Lastly, 65% from females think that they are not exposed to sun light in enough quantity; however 42.7% from the males think that they have enough exposure to sunlight.

In table 5, relationship between males and females towards signs and symptoms for vitamin D deficiency was exist. As females that complaining from vitamin d deficiency are higher than males who have suffering from it (74.1% compared to 3.8%). As well as suffering from muscle pain and fatigue was higher in females (88.2%). Finally, from who have suffering from such disease, females might seen have higher awareness towards disease, since 57.5% are taking treatment, while only 33.8% from males are taking treatment.

Third part: to estimate the percentage of T2DM Saudi Adults taking vitamin D supplements.

In last table, 21.9% from participants are taking vitamin D supplement. Only 2.7% from the participants have no knowledge about the sources of vitamin D. 27.1% of the participants agreed that sun was a source for vitamin D, and about 9% from them agreed that either vegetables and eggs and fruits are suitable source for vitamin D.

Table 4: Participants sun exposure profile (n=316)

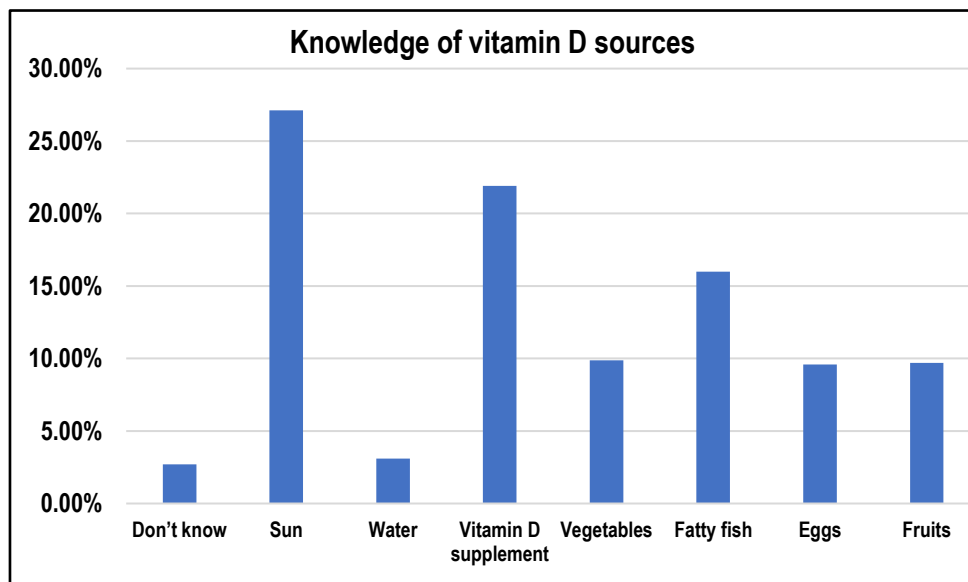
Parameter			Gender		Total	P-value
			Male	Female		
Like going to sun exposure	Yes	Count	61	128	189	0.27
		% within Gender	63.5%	58.2%	59.8%	
	No	Count	30	86	116	
		% within Gender	31.3%	39.1%	36.7%	
	I do not know	Count	5	6	11	
		% within Gender	5.2%	2.7%	3.5%	
Use parasol to shade from sun	Yes	Count	13	26	39	0.479
		% within Gender	13.5%	11.8%	12.3%	
	No	Count	83	191	274	
		% within Gender	86.5%	86.8%	86.7%	
	I do not know	Count	0	3	3	
		% within Gender	0.0%	1.4%	0.9%	
Sunscreen use	Yes	Count	2	47	49	0.000
		% within Gender	2.1%	21.4%	15.5%	
	No	Count	89	164	253	
		% within Gender	92.7%	74.5%	80.1%	
	I do not know	Count	5	9	14	
		% within Gender	5.2%	4.1%	4.4%	
Frequency of using sunscreen	Everyday	Count	4	28	32	0.043
		% within Gender	4.2%	12.7%	10.1%	
	<2 days/week	Count	86	173	259	
		% within Gender	89.6%	78.6%	82.0%	
	>2 days/week	Count	6	19	25	
		% within Gender	6.3%	8.6%	7.9%	
Think have enough exposure to sunlight	Yes	Count	41	52	93	0.000
		% within Gender	42.7%	23.6%	29.4%	
	No	Count	37	143	180	
		% within Gender	38.5%	65.0%	57.0%	
	I do not know	Count	18	25	43	
		% within Gender	18.8%	11.4%	13.6%	

Table 5: Signs and symptoms for Vitamin D deficiency profile (n=316)

Parameter			Gender		Total	P-value
			Male	Female		
Complaining from vitamin D deficiency	Yes	Count	42	163	205	0.000
		% within Gender	43.8%	74.1%	64.9%	
	No	Count	22	33	55	
		% within Gender	22.9%	15.0%	17.4%	
	I do not know	Count	32	24	56	
		% within Gender	33.3%	10.9%	17.7%	
Suffer from muscle pain and fatigue	Yes	Count	68	194	262	0.000
		% within Gender	70.8%	88.2%	82.9%	
	No	Count	28	26	54	
		% within Gender	29.2%	11.8%	17.1%	
If yes, did take treatment	Yes	Count	23	111	134	0.001
		% within Gender	33.8%	57.5%	51.3%	
	No	Count	45	82	127	
		% within Gender	66.2%	42.5%	48.7%	

Table 6: Participants knowledge of vitamin D sources profile (n=1032)

Knowledge of vitamin D sources	Count	Table N %
Don't know	28	2.71%
Sun	280	27.13%
Water	32	3.10%
Vitamin D supplement	226	21.90%
Vegetables	102	9.88%
Fatty fish	165	15.99%
Eggs	99	9.59%
Fruits	100	9.69%



DISCUSSION

With the strong relation between vitamin D deficiency and diabetes mellitus, the public’s awareness regarding this relation is an important aspect to take inconsideration to be able to maintain a normal level and prevent the complications that can happen since it is a common presentation to have vitamin D deficiency although we are in a sunny country like Saudi Arabia. 316 type 2 diabetic patients participated in this study, the majority were ranging between 25 to 59 years old, married, non-smoker, and half the sample had university degree.

Majority of the sample have heard about vitamin D, and half of them have heard about it from health care professionals, which was similar to the study done in Riyadh where most participants (98.4%) have heard about it either from health care provider, friends or media.⁴ And in other cross-sectional retrospective study conducted by Abulmoein E which showed that majority of their sample have heard about vitamin D.⁵

More than half the population like being exposed to the sun, and the majority don't use parasol to shade sunlight, despite only small sample that actually uses sun screen less than twice a week. What seems to be interesting is that more than half the samples think that they are not exposed to sunlight enough. Which may indicate that people may not have enough information regarding sun exposure. Which is a similar finding to the cross-sectional retrospective study that was conducted by Abulmoein E in Jeddah.⁵ In our study a high percentage of diabetic males were found to be thinking that they are exposed to sun enough unlike the diabetic females where more than half the sample think they

are not exposed to sun enough, which is a similar finding to the study that was conducted by Yousef S in 2015 where the Boys had a higher prevalence and frequency of sun exposure than girls.⁶ Which can be common finding since most girls cover up their body when going out with hijab so they have less chances for sun exposure.

The majority of our sample that suffered from vitamin D deficiency was diabetic females, and the most common complain that they had were muscle pain and fatigue. More than half the diabetic female sample was taking supplements, unlike the males. Which indicated that the awareness regarding vitamin D was higher in diabetic females than males.

Sun had the highest percentage regarding the source of vitamin D, but what is most important is that a good number pointed supplements, fatty fish, vegetable, eggs, and water as a source for vitamin D. while some don't know any source for vitamin D which indicates that the public require more knowledge regarding vitamin D sources, as it could be a main reason for vitamin D deficiency.

LIMITATIONS

This study was conducted in a small sample, with a close-ended questionnaire, and the information that was gathered was limited.

RECOMMENDATIONS

Increasing the knowledge of the public especially who suffer from diabetes is an important aspect that should be focused on to increase their awareness and improve their health. They should

be advised to visit the doctor to explain to them the importance of vitamin D and start them on prophylactic doses of vitamin D as initial step to solve this issue, and to try to add an education clinic for the patients or refer them more frequently to the health educator in the same hospital since high percentage in this study had their knowledge from health care practitioners. Encourage community campaigns more frequently to increase the awareness regarding the relation between vitamin D and diabetes and correct the wrong ideas in the public, and using social media as an important way to reach as much as possible from the public. Increase the education in schools to increase the knowledge in all age groups, and to design out-door areas for women to be able to uncover and to be exposed to sun more frequently.

CONCLUSION

It was predicted that there is a relation between type 2 diabetes mellitus and vitamin D deficiency since there is high percentage of type 2 diabetic patients suffering of vitamin D deficiency in our population. Our study aimed to evaluate awareness of Vitamin D deficiency among type 2 diabetes mellitus patients in Saudi Arabia. According to the data that were collected patients showed variable awareness about vitamin D importance. Most of them have heard about vitamin D, and half of them have heard about it from health care professionals which highlighted the lack of public knowledge about vitamin D. Regarding sun exposure more than half the samples think that they are not exposed to sunlight enough which may indicate that people may not have enough information regarding sun exposure. Our results also showed that males think they are exposed to sunlight more than females which indicate that diabetic female population need more education and motivation regarding sun exposure. The majority suffered of vitamin D deficiency were diabetic females. More than half the diabetic female sample were taking supplements, unlike the males which indicate that the awareness regarding vitamin D is higher among diabetic females than males. Regarding vitamin D sources most of patients knew that the sun is a source of vitamin D, while some of them also had more answers regarding the sources of vitamin D like egg, fish, vegetables etc. while some patients have no idea about vitamin D sources which indicate the lack of vitamin D sources and importance among some diabetic patients. As the data showed some diabetic patients need more education regarding vitamin D sources, importance and complications of vitamin D deficiency especially among diabetic patients.

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