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Risk factors related to vitamin D deficiency in Adult Saudi Population in Al Qurayyat

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ABSTRACT

Background: Vitamin D deficiency is the most prevalent dietary deficit, and it is a worldwide epidemic in Saudi Arabia. **Methods:** A cross-sectional study was conducted among the general population in Al-Qurayyat city during the period from 10 October to 17 October. Both genders were included with age ranged from 20-40 years. A questionnaire was used in this study. Questionnaire consisted of groups of questions to determine the most common risk factors related to vitamin D deficiency.**Results:** A total of 105 participants with both genders 93 females and 12males were included in the study. Age was positively correlated with vitamin D level. There was a significant inverse correlation between serum 25 (OH) D concentrations and duration of sun exposure.**Conclusion:** The etiology of the high prevalence of vitamin D deficiency in our study is multifactorial, where lack of sunlight exposure and inadequate diet are the most important factors.

Keywords: Vitamin D deficiency,Sun exposure

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Introduction

Vitamin-D deficiency is a universal health problem caused primarily by inadequate exposure to sunlight`s ultraviolet through cutaneous synthesis. Another source is through the diet, including foods such as seafood, shrimp, mushroom, egg yolk and fortified milk (1). Vitamin D is produced in the human skin through photochemical conversion of 7-dehydrocholesterol to cholecalciferol (vitamin D3) (2). Vitamin D3 is then metabolized to 25-hydroxyvitamin D (25(OH)D), the main storage and circulating form of the vitamin, and then to 1, 25-dihydroxyvitamin D by the hepatic and the renal enzymes (3).

Vitamin D deficiency is very common in elderly people, but there are few reports on its prevalence in young adults (4). Therefore, it is important to determine the risk factors that are associated with vitamin D deficiency among those young adults in order to establish relevant strategies to prevent and manage this serious health problem (4,5).

The purpose of this study was to identify the major risk factors which might be associated with vitamin D deficiency among a sample of population (females and males) living in Al Qurayyat, North Province, Kingdom of Saudi Arabia by evaluating selected variables related to socio-demographic, lifestyle and health status characteristics, as well as, dietary supplements intake.

Subjects, Materials and Methods:

A cross-sectional study was conducted among the general population in Al-Qurayyat city during the period from 10 October to 17 October. Both genders were included with age ranged from 20-40 years.

Data collection:

An online questionnaire posted through a google form was used. Data were obtained from participants that included socio-demographic information such as age, weight, marital status, educational level and occupation. Information about dietary intake such as drinking milk, seafood (Fish, tuna, shrimp) was included as well as the duration of sun exposure. Both Vitamin D, calcium supplements intake and physical practicing were involved. Moreover, the latest vitamin D test, where vitamin D was considered normal if 75 nmol/L, insufficient if between 25-75 nmol/L and deficient < 25 nmol/L.

Statistical analysis:
Data were entered in a computer and analysed using Statistical Package for Social Sciences (SPSS). A chi-square test was used to assess statistically significant associations between vitamin D level in blood and different variables. A P-value of ≤ 0.05 was considered as a significant cut-off point with a 95% confidence interval.

Results:
A total of 105 participants with both genders 93 females and 12 males were included in the study. As shown in Table 1 and figures 1-5, Socio-demographic characteristics of participated subjects were illustrated. The percentage of the age ranged from (20-26) years was the highest 51%, The percentage of (27-33) years was the lowest. Chi-Square value was 2.893, with non-significant P value (0.576). The percentage of females was the highest 59%, The percentage of male was the lowest 11%. Chi-Square value was 12.372, P value (0.02). The percentage of married participants was 43%, while single was 57%. Chi-Square value was 0.195, with not significant P value (0.924). The percentage of body weight (70 & more) class was 66% while the percentage of (less than 70) class was 34%. Chi-Square value was 2.136 with not significant P value (0.344). The percentage of university class was 67%, while The percentage of elementary class was the lowest 2%. Chi-Square value was 6.722, not significant P value (0.347). The percentage of employed subjects was the highest 73% while it was the lowest 27 in unemployed class, Chi-Square value was 1.097, P value (0.875) not significant.

Table (1): Socio-demographic characteristics of participated patients:

Socio-demographic	Category	Vitamin(D)level						Total		Chi-Square value(X^2)	PValue
		Less25		75-25		Morethan 75					
		f	%	f	%	f	%	f	%		
Age	26-20	23	%43	26	%49	4	%8	53	%100	2.893	0.576
	33-27	9	%60	6	%40	0	%0	15	%100		
	40-34	17	%46	19	%51	1	%3	37	%100		
	total	**49**	**%47**	**51**	**%49**	**5**	**%5**	**105**	**%100**		
Gender	Male	5	%42	4	%33	3	%25	12	%100	12.372	0.002
	Female	44	%47	47	%51	2	%2	93	%100		
	total	**49**	**%47**	**51**	**%84**	**5**	**%27**	**105**	**%100**		
Maritalstatus	Single	27	%45	30	%50	3	%5	60	%100	0.195	0.924
	Married	22	%49	21	%47	2	%4	45	%100		
	total	**49**	**%47**	**51**	**%49**	**5**	**%5**	**105**	**%100**		
Weight	70andmore	18	%50	15	%42	3	%8	36	%100	2.136	0.344
	Lessthan 70	31	%45	36	%52	2	%3	69	%100		
	total	**49**	**%95**	**51**	**%94**	**5**	**%5**	**105**	**%100**		
Education Level	Elementary	1	%50	1	%50	0	%0	2	%100	6.722	0.347
	Intermediate	5	%71	2	%29	0	%0	7	%100		
	Secondary	7	%27	17	%65	2	%8	26	%100		
	University	36	%51	31	%44	3	%4	70	%100		
	Total	**49**	**%47**	**51**	**%49**	**5**	**%5**	**105**	**%100**		
Employment Status	Employed	11	%39	15	%54	2	%7	28	%100	1.097	0.875
	Unemployed	38	%49	36	%47	3	%4	77	%100		
	Total	**49**	**%47**	**51**	**%49**	**5**	**%5**	**105**	**%100**		
Smoking	Yes	1	%2	3	%6	0	%0	4	%100	1.214	0.545
	No	48	%98	48	%94	5	%100	101	%100		
	total	**49**	**%47**	**51**	**%49**	**5**	**%5**	**105**	**%100**		

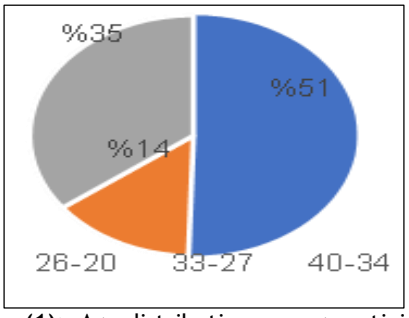

Figure (1): Age distribution among participants

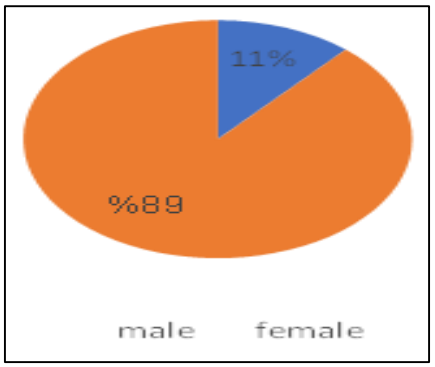

Figure (2): Gender distribution among participants.

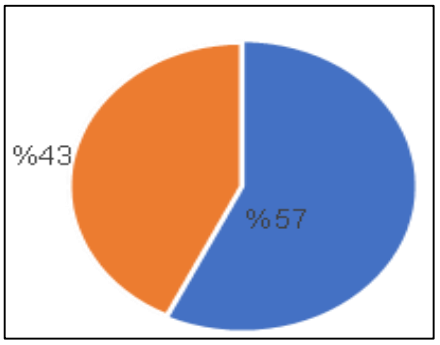

Figure (3): Marital status among participants

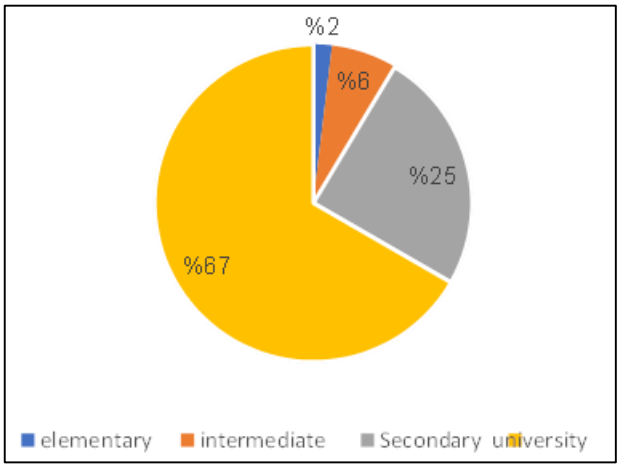

Figure (4): Education Level (elementary, intermediate, secondary, university)

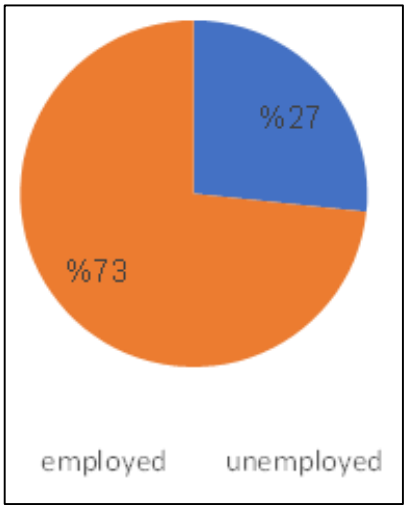

Figure (5): Employment Status

Table (2): Sun exposure, milk type, Drink milk daily, Supplement of Calcium and Vitamin D:

Sun exposure and DietPattern	Category	Vitamin(D)level						Total		Chi-Squarevalue (X^2)	P Value
		lessthan 25		75-25		morethan 75					
		f	%	f	%	f	%	f	%		
Sun exposure	less than15minutes	42	%49	41	%48	3	%3	86	%82	3.943	0.139
	15minute andmore	7	%37	10	%53	2	%11	19	%18		
	total	49	%47	51	%49	5	%5	105	%100		
Milktype	rawmilk	5	%45	5	%45	1	%9	11	%10	2.813	0.59
	commercial milk	30	%47	31	%48	3	%5	64	%61		
	both	14	%47	15	%50	1	%3	30	%29		
	total	49	%47	51	%49	5	%5	105	%100		
Drink milkdaily	neveror rarely(once)	39	%48	38	%47	4	%5	81	%77	7.437	0.115
	twice	8	%50	7	%44	1	%6	16	%15		
	3times ormore	2	%25	6	%75	0	%0	8	%8		
	total	49	%47	51	%49	5	%5	105	%100		
Supplement of Vitamin D	yes	24	%49	17	%33	0	%0	41	%39	7.219	0.027
	no	25	%25	34	%67	5	%8	64	%61		
	total	49	%47	51	%49	5	%5	105	%100		
Supplement of Calcium	yes	7	%14	11	%58	1	%5	19	%18	2.958	0.228
	no	42	%86	40	%47	4	%5	86	%82		
	total	49	%49	51	%51	5	%5	105	%100		
Physical Practicing	daily	6	%12	4	%8	0	%0	10	%10	2.112	0.715
	3-2per week	17	%35	15	%29	3	%60	35	%33		
	never	26	%53	32	%63	2	%40	60	%57		
	total	49	%47	51	%49	5	%5	105	%100		

As Table (3) showed, the Odds Ratio is 1.46 which mean that; the sun exposure more than 15 minutes daily increase the ratio of Vitamin D Level to be (25-75), the correlation between Vitamin D Level and sun exposure is positive (0.484).

Table (3): The relation between Vitamin D Level and sun exposure:

VitaminDLevel	lessthan 15 minutes		15minute and more		Total	OddsRatio	CI	PValue
	N	%	N	%				
Less25	42	50.6	7	41.2	49	1.46	0.51-4.21	0.484
75-25	41	49.4	10	58.8	51			
Mean	1.17		1.51					
Standard Deviation	0.378		0.502					
Total	83	100	17	100	100			

Discussion

Several studies have drawn attention to the prevalence of vitamin D deficiency worldwide. Most of these studies focused on elderly people, with few reports on the prevalence of vitamin D deficiency in young adults (4,5).

Al-Qurayyat city, which located in the northern part of Saudi Arabia remotely located from seacoast compared to Eastern and Western regions of the kingdom which may drive the population dietary habits to depend mainly on cattle and poultry meat rather than sea food, which is known as a good source of vitamin D.

The influence of socio-demographic characteristics has been observed in our study. Younger people have more vitamin D deficiency than elderly. however, in contrast, other studies showed that vitamin D level decreases as age increases. The duration of sunlight exposure necessary to maintain adequate stores of vitamin D has always been a controversial issue, but recently, it was recommended to be 10-15 minutes per a day (4,6). Our study found significant relationship between vitamin D level with sun exposure. The females had more vitamin D deficiency than males, so the gender represents also a significant risk factor with vitamin D deficiency.

This may be attributed to the nature of male situation that related to their daily work and their exposure to the sun longer time than females.
Employment status had a large impact on vitamin D level in our study, where hypovitaminosis D was more common among unemployment adults. This finding could be explained by the fact that the unemployed are less exposed to the sun for staying at home. in contrast with Al-Mogbel study showed that hypovitaminosis D was more common among employment participants (4).
In Educational levels the university class had more deficiency of vitamin D, the diet for those in the workplace compromise mainly fast food, which lacks many important vitamin and minerals. Although Saudi Arabia enjoys a sunny climate throughout the year, direct exposure to sunlight by the local population is limited due to high daytime temperature, as observed in our study.

Conclusion and Recommendations:
In conclusion vitamin D status seems to be an important issue facing the world today. The etiology of the high prevalence of vitamin D deficiency in our study is multifactorial, where lack of sunlight exposure and inadequate healthy diet are the most important factors. Importance of vitamin D and health education should be enhanced.

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