

Prevalence Of Vitamin D Inadequacy In Peri And Postmenopausal Women Presented At Dow University Hospital, Ojha Campus. A Cross Sectional Study

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Citation

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Abstract

Background:

An optimal level of serum 25(OH) D levels is essential for health. The objective of study is to assess the prevalence of serum 25 (OH) D inadequacies in peri and postmenopausal women, who presented at Dow University Hospital, Ojha campus.

Methods:

It was cross sectional study conducted in the Department of Gynaecology & Obstetrics, Dow University Hospital, Ojha campus, Karachi, from March 2011 to March 2012. Total 100 women of peri and postmenopausal age were included in the study, presented at Gynaecology OPD, Dow University Hospital, Ojha Campus. After taking consent a questionnaire was filled regarding age, physical activity level, duration of sun exposure, body parts exposed to sunlight, dietary intake of vitamin D etc. Serum 25(OH) D levels assessment was performed in Dow Lab by chemelumincisce immunoassay technique. Vitamin D deficiency was defined as a level <20 ng/ml, insufficiency, 20-29 ng/ml and sufficiency, >30ng/ml. Data was analyzed by using SPSS version 16.

Results:

100 women of peri and postmenopausal age group were included in the study. Out of which 63% women were of perimenopausal age group and 37 % were found of menopausal age group. Out of which 10 % women had no formal education, 67% women were having sedentary life style. Out of 100 women, 85% women were belonged to middle class family, 53% women were found to be not exposed in sun light, 18% women wearied hijab. Sunlight was not reached at residence of 50% of women, 10% women used sunscreen in our study. Vitamin D insufficiency was observed in 64% women and deficiency was found in 31% of women. Women were found to be deficient in dietary intake, in form of milk and product, egg, fish intake and supplements.

Conclusion:

The study points out a high prevalence of vitamin D inadequacy in peri and postmenopausal women. This requires recommendation for change in life style and vitamin D supplementation as preventive and therapeutic measures in this age group.

BACKGROUND

Vitamin D deficiency is a well-recognized epidemic problem worldwide. It is also common in older adults. Different recent studies have been reported deficiency in 18-25% of adult postmenopausal women [1, 2]. Vitamin D is produced endogenously by the exposure of skin to sunlight, and absorbed from food containing or supplemented with

vitamin D. It is metabolized first in liver to 25-hydroxyvitamin D [25(OH) D] and then in kidney to 1, 25-dihydroxyvitamin D [1, 25(OH)2D], before becoming biologically active [3]. It plays an important role in bone growth and maintenance by enhancing intestinal absorption of calcium and influencing bone metabolism in other ways.

Aging has been shown to affect vitamin D synthesis, primarily through a lesser capability of skin biosynthesis[4]. Vitamin D deficiency results from several factors including inadequate sun exposure, poor nutrition and certain medications such as anticonvulsant. Penetration of ultra violet rays into the skin is impaired by various factors such as lassitude, season, skin pigmentation and protection of sun exposed areas by sunscreen or clothing [5, 6]. Vitamin D deficiency has been reported in different other studies as well [7, 8].

Vitamin D deficiency has been historically defined and recently recommended by the Institute of Medicine (IOM) as [9,10]

Ø Vitamin D deficiency <20 ng/ml,

Ø Vitamin D insufficiency 21-29 ng/ml,

Ø Vitamin D sufficiency >30ng/ml.

Ø Vitamin D toxication >150ng/ml

The highest prevalence has been reported from community living postmenopausal women in Southern European countries, 32% in Italy, (total vitamin D level <12ng/ml) [11], 39% [12], to 59.6% [13], in France. (Total vitamin D level <12ng/ml).

The objective of current study is to determine serum 25(OH) D levels and factors which can leads to deficiency of vitamin D in peri and postmenopausal women.

The rationale of study is to identify factors which are responsible for vitamin D deficiency so the recommendation can be made to overcome this problem. Ultimately improvement can be made in life style of peri & postmenopausal women.

PATIENTS & METHODS

Total 100 women of perimenopausal (The period of transition to natural menopause during which the body undergoes endocrinological and biologic changes, resulting from declining ovarian hormone production; symptoms can include irregular menstrual periods, hot flashes, vaginal dryness, insomnia, and mood swings.) and postmenopausal age group (started after 6 months of menopause) were included in this study, who presented at outpatient department of Gynaecology, Dow University Hospital, Ojha Campus. It was a cross sectional study conducted during the

time period of March 2011 to March 2012. After taking consent a questionnaire was filled which included age, parity, BMI, physical activity level, duration of sun exposure, body parts exposed to sunlight, use of sun screen, dietary intake of vitamin D and intake of supplements etc. Serum 25-hydroxyvitamin D [25(OH) D] assessment was performed in Dow Lab by chemiluminescent immunoassay technique. Diagnosis of vitamin D deficiency was considered when serum 25(OH) D levels were <20 ng/ml, vitamin D insufficiency was considered when levels were 21-29ng/ml and sufficiency, when levels were >30ng/ml.

Data management and statistical analysis was conducted by using SPSS software version 16. Descriptive statistics were calculated for all variables. Chi square test was performed to assess the differences in frequencies of discrete variables. All the statistical tests used the probability value of $p < 0.05$ as the significance level.

RESULTS

A total of 100 women of peri and postmenopausal age, included in the study, Table # 1 summarize the different variables and their association with total vitamin D deficiency.

Age range was 40-45 in 43% of women, 46-50 in 29 % women and 28 % women were of 51 and more than 51 years of age. Perimenopausal age was comprised of 63%, while 37 % women were of menopausal age group.

Regarding the educational level, 10% women were illiterate, 90% women of them were belong to educated group at different levels. It was also determined that 9% women were belonged to upper class, 06% of them from lower class and remaining 85% of them were belonged to middle class family.

Out of hundred women 53% women were found to be not exposed in sun light, 37% of them were exposed to sun light for at least 30 minutes or less per day and only 10% of them were exposed, for more than 30 minutes. In our study 18% women were used to wear hijab and face and hands remained exposed in remaining 82% of women. In 53% of them there was no exposure of sunlight at their homes. Only 10% women used sunscreen in our study.

Serum vitamin D levels are presented in Table # 2. Vitamin D insufficiency was observed in 64 % women and deficiency was reported in 31 % of women. Only 5% women were found sufficient for serum vitamin D level. Significant

Prevalence Of Vitamin D Inadequacy In Peri And Postmenopausal Women Presented At Dow University Hospital, Ojha Campus. A Cross Sectional Study

association of vitamin D level was found with body part exposed to sunlight (Chi square 12.34, p=0.002). Significant association was also reported between socioeconomic status, education and duration of sun exposure.

Regarding summary of dietary intake out of 100 women 68% women had no intake of milk & milk products, 22% had at least 2 servings per week and only 10% had serving greater than two times, as shown in table #1. (Chi square 9.680, p=0.04). 94% women had no fish intake as dietary source of vitamin D.

If we discuss about vegetable intake, it was found that 54% of them had vegetable intake two times per week in their diet, 23% of them had no intake and 23% of them had more than twice per week. (Chi square 10.04, p=0.04). It was also determined that 46% women had no egg intake in their diet, only 17% women had intake greater than twice per week. (Chi square 14.29, p=0.006). Regarding the supplement use 10% women were found to use it regularly, 12% had occasional use and 78% had no use.

Table 1

variables	No of patients (n=100)	%age
Age (years)		
40-45	43	43
46-50	29	29
51+	28	28
Age group		
Perimenopausal	63	63
menopausal	37	37
Level of education		
No education	10	10
Primary	29	29
Secondary	46	46
Graduate	12	12
postgraduate	03	03
Socioeconomic status		
Lower	06	06
Lower middle	38	38
Upper middle	47	47
upper	09	09
Sun light exposure per day(minutes/hour)		
No exposure	53	53
< 30minutes	37	37
30min_1hour	10	10
Exposure to body parts		
Women wear hijab(cover whole body)	18	18
Women not wear hijab (face & hand exposed)	82	82
Sunlight exposure at home		
No sunlight at any time	50	50
Sunlight reached	50	50
Use of sun screen		
Applied on face	07	07
Applied on face & arm	03	03
Not applied	90	90
Food source of vitamin D		
Fish		
No intake	94	94
Once/week	05	05
>once/week	01	01
Milk & products		
No intake	68	68
2 serving/week	22	22
>2 serving/week	10	10
Yogurt intake		
No intake	69	69
Once/week	27	27
Twice/week	04	04
Vegetables intake		
No intake	23	23
Twice/week	54	54
>twice/week	23	23
Egg		
No intake	46	46
Up to 2 times/week	37	37
>2times/week	17	17
Supplements		
No use	78	78
Occasional use	12	12
Regular use	10	10

Table 2

Serum 25(OH) D levels

Serum 25(OH) D levels	Cut off levels (ng/ml)	No of patients (n=100)	%age
Vitamin D deficiency	<20	64	64
Vitamin D insufficiency	21-29	31	31
Vitamin D Sufficiency	>30	05	05
Vitamin D toxication	150	00	00

Table 3

Duration of sun exposure & Serum 25(OH) D levels

Duration of Sun exposure (time/day)	Serum 25(OH) D levels			total	p-value
	Vitamin D deficiency <20 ng/ml	Insufficiency 21-29ng/ml	Sufficiency >30ng/ml		
No exposure	42	10	01	53	0.001
Upto30 min	21	13	03	37	
30 min-1hour	01	08	01	10	
total	64	31	05	100	

Table 4

Residence & vitamin D level

Residence	Serum 25(OH) D levels			total	P-value
	Vitamin D deficiency <20ng/ml	Insufficiency 21-29ng/ml	Sufficiency >30ng/ml		
1-Sun light not reached	39	10	01	60	0.000
2-Sunlight reached	25	21	04	40	
total	64	31	05	100	

DISCUSSION

Various studies have been reported high prevalence of vitamin D inadequacy in peri and postmenopausal women. Study conducted by Gaugris et al reported high prevalence in postmenopausal women especially those, who had osteoporosis and history of fracture [14]. Studies from different parts of India have also reported deficiency of vitamin D in different age groups.[15,16].

Among the studies of postmenopausal women prevalence of vitamin D inadequacy ranged from 1.6 to 86% [17,18], lowest prevalence was reported by kinyamu et al [17] and highest by Sambrook et al [18]. The present study also showed high prevalence, as 95% women were found vitamin D deficient.

Various studies have quoted that, vitamin D synthesis depends upon adequate sun exposure [19,20,21]. Around 15-20% of the body surface needs to be exposed to sun to provide minimal dose of ultraviolet light (that is sufficient for conversion of cholcalciferol from its precursors) [22] and 15 – 30 minutes sun exposure can provide 90-100% of vitamin D [23]. Sun exposure should be at least two times per week to the face, arms, hands or back without sunscreen. Cultural reason can also play important role in vitamin D

deficiency. In current study women who were (18%) used to wear hijab, found at high risk. Another study conducted on Arabic women by Glerup H et al, reported serum vitamin D level of 7.1nmol/l in Arab women [24], because most of these women were avoided sun exposure due to cultural and social reasons.

Various studies reported increased risk in elder women who were home bounded [25, 26]. This is consistent with our study as most of women were less active outdoor.

Our study showed that only few women applied sunscreen to protect their skin; this is not consistent with study conducted in Australia by Wolpowitz D et al. High percentage of these women used to apply sunscreen to protect them from skin cancer [27]. Ultimately the recommendation for the avoidance of sun exposure has put the world's population at risk of vitamin D deficiency.

The institute of medicine recommends 200 IU/d of Vitamin D for the adults younger than 51, 400IU/d for adults 51-70 and 600IU/d for those older than 70 years [28, 29]. US food and Drug Administration recommends 400IU/D 10microngram/d) regardless of age.

Few foods naturally contain vitamin D, like oily fish such as salmon (400IU per 3.5oz), mackerel and cod liver oil (400IU/TSF). Egg yolk also contain vitamin D (approximately 20IU) [30,31], but more commonly consumed food such as milk, butter, egg all give less than 100IU vitamin D [32]. This study points towards inadequate dietary intake in the form of dairy products and vegetables. This finding of our study was opposite to the study conducted by Rehman SA et al on Malays and Chinese women, as these women had higher consumption of egg, milk and milk products [33].

Results have shown that fish consumption was also lower in Pakistani women. These results were again not consistent with study conducted by Rehman SA et al, on Malays and Chinese women [33].

A community based study conducted in Karachi by Khan AH et al, they found deficiency of vitamin D in 90.5% of participants. Most of women in this study were of perimenopausal age. These results have supported our study [34].

Postmenopausal women are a primary concern for vitamin D inadequacy, as these women already at risk osteoporosis due

decreasing estrogen levels. Supplementations could be helpful to increase bone mineral density in these women [35].

In current study 22% were at regular vitamin D supplements, level of vitamin D was found comparatively more in these women. Supplementation with vitamin D prevents vitamin D deficiency in 98% of general population. [36, 37] It was proved by another study conducted by Tangpricha et al. They reported that serum 25(OH) D levels were higher in women who had taken multivitamin as compared to milk and products[38].

CONCLUSION

The reported study concluded the high prevalence of vitamin D deficiency in Pakistani peri and postmenopausal women. Significant positive association seen between level of Vitamin D and sun exposure, education, socioeconomic state and dietary intake.

RECOMMENDATION:

Vitamin D deficiency is global problem. Adequate vitamin D and calcium intake is the cornerstone of osteoporosis prevention. There is need to create awareness in women and

clinician about serum 25(OH) D deficiency. There is need of more aggressive screening of vitamin D inadequacy with serum 25 (OH) D levels and requirement of fortification of food with vitamin D as well.

There is need to made recommendation for change in life style (avoidance of indoor confinement, proper sun exposure, optimal dietary intake of calcium and vitamin D) and vitamin D supplementation as preventive and therapeutic measures in this age group.

Competing interests

The authors declare that they have no competing interests.

Authors Contribution

All the authors equally contribute in study

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References

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