Vitamin D Level Status and Hypertension among Old Adult Iraqi People in Al Hillah City

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Abstract

Background: Vitamin D has different biological actions in the body . Vitamin D has the pleiotropic effects in multiple organ systems, and vitamin D deficiency was suggested to be associated with high blood pressure according to previous reports. Several interventional studies have examined the effect of vitamin D supplementation on high blood pressure patients

Objective : to identify Vitamin D level and its correlate with hypertension among old adults.

Methodology: This was across sectional descriptive observational study included convenient sample of elderly people in Hilla City ,Babylon province, the period of the study started from the first of January through August 2019, a pretested semi structured questionnaire was used to interview the participants who attended primary health centers after obtaining their verbal consents, the sample included(300) old adult of both gender, serum level of Vitamin D was assessed by chemo immunoassay method, the blood pressure was measured single handy by the researcher using mercury sphygmomanometer to diagnose hypertension.

Results: The study included 300 participants 83.0% of the study sample had either insufficiency or deficiency of Vitamin D level. Hypertensive people had significant Vitamin D Deficiency (both deficiency and insufficiency of vitamin D, 81% and 70%) respectively as compared to normotensive participants , this difference was statistically significant $p<0.05$**.**

Conclusion: there was a significant inverse relationship between vitamin D level and blood pressure.

Keywords : *Vitamin D levels, Hypertension , Old adults,Iraq*

Introduction

There is a remarkable increase in incidence of cardiovascular diseases in both lower- and middle-income countries including Iraq [1], hypertension is also increasing [2]. Arterial hypertension is an important and serious public health problem which is responsible for 6% of deaths globally every year and can result in devastating complications such as peripheral vascular disease, heart failure, stroke, and renal failure [3]. Vitamin D deficiency has been blamed to be a risk factor of arterial hypertension for both systolic and diastolic blood pressure [4-8].

Since elderly population have low intake of vitamin D, limited exposure to sunlight, and insufficient capacity in their skin to produce vitamin D, they are at high risk of deficiency and related complications including hypertension [9], There is a growing body of evidence from animal and clinical studies that vitamin D-mediated reduction of hypertension involves increased activation of the renin–angiotensin–aldosterone system [10-11] other studies reported that vitamin D can be taken as a drug for hypertensive patients mainly by the elderly people [12-14], the gold standard of epidemiological studies of vitamin D blood levels and hypertension have been null [15].

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This study was conducted to identify the prevalence of Vitamin D Deficiency (VDD) among hypertensive patients and non-hypertensive to estimate the association between these variables.

Methodology

This was across sectional descriptive observational study included a non-probability (convenient sample) of elders (>65 years both women and men) in Hilla City, Babylon province, Iraq, the period of the study started from the first of January through August 2019, the sample size was calculated according to the sample size calculation equation with 95% confidence level, 300 elderly people were participated voluntarily in this study, all of them agreed to participate after explaining the objective of the study by the researcher(response rate 100%). This study was approved by the Ethics Committee of College of nursing - University of Babylon, a pretested questionnaire was used to interview the participants after obtaining their verbal consents, the sample included old adults, apparently health & not receiving vitamin D supplement, serum level of Vitamin D that made by chemo immunoassay method (maglumi instrument). Data about demographic characteristics , drug uses, number of chronic diseases, as well as measurement of mean systolic and diastolic blood pressure of each participant were done single handy by the researcher himself. Blood pressure was measured in the sitting position. Patients were kept seated quietly for at least 5 min in a chair**.** Blood pressure was measured using a sphygmomanometer with an appropriate cuff the cutoff values, blood pressure more than 140\90 considered hypertension in this study or those who diagnosed previously as hypertensive and taking antihypertensive drugs. Vitamin D levels are divided into three categories .deficient < 20ng/ml, insufficient between 23-29ng/ml and normal level 30-100 ng/ml [16-17]. Data were analyzed by using the (spss) package version 23. The chi-square test was used to test the associations between variables. The association considered statistically significant when the P-value is less than 0.05.

Results

The study included 300 participants 83.0% of the study sample had either insufficiency or deficiency of Vitamin D level. The proportion of adults with hypertension were more common among participants with deficient and insufficient vitamin D, 81% and 70% respectively , the difference was significant p<0.05.

Table (1) Frequency distribution of the mean age of the study group.

	Age group (year)	**N (%)**	**Mean age**
	65-69 years	168 (56)	67 years
	70 -74 years	84 (28)	73 years
,	75-80and more	48 (16)	78 years 70.44
	Total	300(100%)	

Table(1) shows the distribution of elders according to their age and mean age of the study groups, 65-69year group is the dominant age group ,the overall mean age and the standard deviation are 70.44+3.9

Table (2) Means of vitamin D level according to gender.

		Female	19.5 ng/ml
		Male	25.8 ng/ml
		Male and female	22.5 ng/ml

Table(2) and figure (1) show the frequency distribution of the study participants according to the means of vitamin D level by gender the mean of vitamin D level among females is lower than vitamin D level among males.

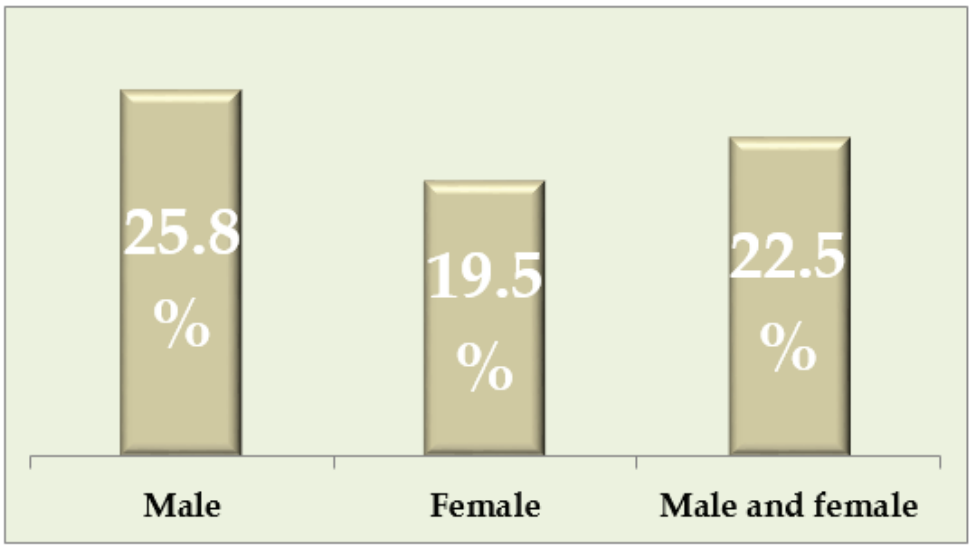

Figure (1) Means of vitamin D level by gender.

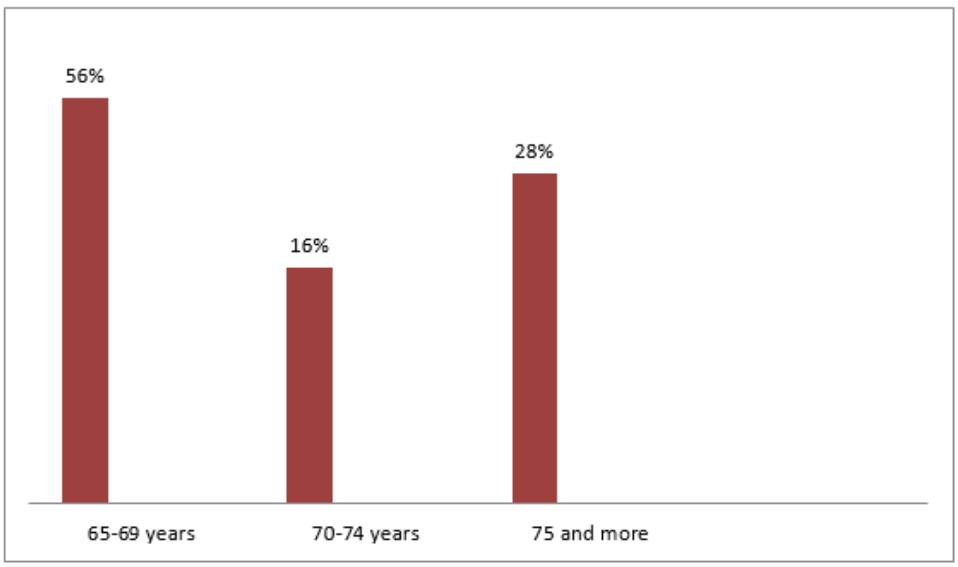

Figure (2) Frequency distribution of the study group by age.

Figure (2) shows the distribution of the elders according to age group, most of the participants in the age group 65-69years(56%).

Table (3) Association between Vitamin D level and Hypertension among males.

Study variables	Vitamin D level among male					χ^2	P-value
	Deficiency (0-20 ng/ml)	Insufficiency (21-29 ng/ml)	Normal (30-100 ng/ml)	Total	Low vitamin D Level (deficiency)		
Hypertension Yes	37 (54.4%)	5 (26.3%)	2 (16.3%)	44	84.0%	57.99	< 0.002*
No	31 (45.6%)	14 (73.7%)	10 (83.7%)	56	55.3%		
Total (%)	68 (68%)	19 (19%)	12 (12%)	99 (100%)			

Table(3) shows that 87% of old males have low serum vitamin D level (less than 3ong/ml)most of them with deficient level , this table also explains a positive highly significant association between low vitamin D and having high blood pressure (Hypertension) among elderly males chi square =57.99, df=2, p<0.002, there is an inverse relationship between the two variables.

Table (4) Association between Vitamin D and Hypertension)among females.

Study variables	Vitamin D level among female					χ^2	P-value
	Deficiency (0-20 ng/ml)	Insufficiency (21-29 ng/ml)	Normal (30-100 ng/ml)	Total	Low level of Vitamin D(deficiency)		
Hypertension Yes	90 (66.1%)	16 (72.7%)	5 (11.6%)	111	81.0%	59.11	< 0.001*
No	46 (33.9%)	6 (27.3%)	38 (88.4%)	90	51.1%		
Total No.(100%)	136 (68%)	22(11%)	42 (21%)	201			

This table(4) shows the prevalence of VDD among old adult women (79%), a highly statistically significant association between low Vitamin D level (less than 30 ng/ml) and Hypertension among elderly females, chi square value=59.1, df=2 , p<0.001.

Discussion

This study examined vitamin D serum levels in apparently healthy old adults both males and females in Hilla city – Babylon province, Iraq, in order to determine the prevalence of vitamin D deficiency and its association with blood pressure. In this study, the vitamin D level status among Iraqi Patients in Al Hillah City and the relation of these dependent and independent variable were assessed in 300 patents the most of sample are females 67%. The low mean of serum vitamin D deficiency in this study is higher in women than in men . Overall, we found that vitamin D deficiency was very common the study group ,the prevalence of Vitamin D Deficiency (VDD) in the current study is about one fifth , this high prevalence health problem is similar to that reported by a study conducted by Kara A and Datta S in India who found that Vitamin D deficiency is significantly prevalent in otherwise healthy old aged population [18].

The Korea National Health and Nutrition Examination Survey reported prevalence of vitamin D deficiency (< 20 ng/mL) of 47.3% in males and 64.5% in females [19], but in a nationwide population-based study conducted in Thailand, only 5.7% of the population had a 25(OH)-D level < 20 ng/mL [20], The prevalence of VDD in our study is higher than that found in local Iraqi study conducted in Baghdad on 20 parkinsonism Iraqi patients with mean age 59 years (62.5%) the same study reported that the proportion of VDD was much lower in the control group (27.5%) [21]. Studies found that there is an increasing prevalence of vitamin D deficiency with age [22]. In general, elder people are more liable to VDD due to many reasons , not only due to decrease skin production of Vitamin D but also due to decreased sunlight exposure , decreased dietary intake, impaired intestinal absorption, and diminished hydroxylation in the liver and kidney [23,24]. Our study depicts a strong association between low serum consecration of vitamin D and increasing both systolic and diastolic blood pressure, this finding goes in line with the findings of other studies that evaluated the association between the level of vitamin D and the blood pressure, the risk of hypertension diminished following elevation of plasma concentrations of 25(OH)D [25]. Another study found an inverse association between 25(OH)D and cardiovascular disease(including arterial hypertension) mortality in old adults with serum 25(OH) D levels of ≤21 ng/mL. [26]. Other studies have reported contradictory results regarding the association between vitamin D level and hypertension in elderly men and women, there is evidence that VDD causes multiple diseases including hypertension and complications. Various mechanisms supposed to play role in the effect of vitamin D on blood pressure, one of which is the renin-angiotensin system which the important contributor to systolic blood pressure . Studies in animals have shown that 1,25-dihydroxyvitamin D reduces renin gene expression by a mechanism that is bound to the vitamin D receptor and thus reduces blood pressure. Vitamin D can also exert antihypertensive effects through different molecular mechanisms. A recent study recommends that Vitamin D can be used as an adjuvant drug to control the blood pressure on hypertension patients with vitamin D deficiency [13].

Conclusion

The results of the current study show a widespread, severe Vitamin D deficiency among participants of both gender in Iraqi elderly people there is a strong association between VDD in elder men and women and hypertension, we suggest starting public educational campaigns to raise public awareness about the relationship between low level of vitamin D and high blood pressure. We recommend further large scale studies are needed to confirm our findings. The health care providers(physicians and nurses)should keep a check on the Vitamin D levels of elderly people in order to curb the ever-increasing incidence of hypertension.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the University of Babylon and all experiments were carried out in accordance with approved guidelines.

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