Vitamin-D Status in General Population of District Buner Khyber Pakhtoonkhwa

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ABSTRACT

Background: Vitamin D is a fat-soluble vitamin. It has effects on almost all organs of the body. Vitamin D has many forms but vitamin D2 and vitamin D3 (cholecalciferol) are most important for human body.
Objective: To determine the frequency of Vitamin D Deficiency in District Buner Khyber Pakhtoonkhwa.
Material and Methods: This case series study was conducted from Jan 2019 to Jun 2020 at DHQ Hospital Daggar Buner. In this study 149 patients were selected randomly with age above 15 years. Patients with musculoskeletal pain, proximal myopathy, generalize body pain, non-traumatic bone tenderness, were included. A cut-off value of less than 8ng/dL was considered as deficient, between 20ng/dl to 30ng/dl as insufficiency and a value of more than 30ng/dl was sufficient. The data was collected with the help of a questionnaire and was put it into SPSS version 16 for analysis.
Results: 115 were females and 34 were males. Out of 149 54 (36.2%) have sufficient, 25 (16.7%) have insufficient and 70 (47%) have deficient Vitamin D levels. The most common population were housewives (62%). 9.3% were with comorbidities (6% diabetic and 3.3% hypertensive). Highest proportions of the Vitamin D deficiency are observed in age groups of 10-19 years and 20-29 Years that is 83.5% and 58.5% respectively. While more than half of the age groups above 39 are Vitamin D sufficient. While in profession groups highest proportion is for the students followed by housewives that is 69% and 51% respectively.
Conclusion: Almost every person in the District Buner is Vitamin D deficient until proven otherwise.
Keywords: Gender, Menopause, Osteopenia, Osteoporosis, Vitamin D.

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INTRODUCTION

Vitamin D is a fat-soluble vitamin. It has effects on almost all organs of the body. Vitamin D has many forms but vitamin D2 (Ergocalciferol) and vitamin D3 (cholecalciferol) are most important for human body. These are combinedly called calciferol[1]. Vitamin D can be obtained from sunlight, diet, and supplements. Biological inert vitamin D is converted into active form (1, 25 hydroxycholecalciferol) by hydroxylation. Vitamin D facilitate calcium absorption from intestine which in turns promote healthy growth and bones remodeling. Beside calcium hemostasis in the body[2], vitamin D has steroids like action in the body. Recent research also supports the role of vitamin D in immune system enhancement and as a tumor suppressor[3]. Vitamin D also has role in prevention of chronic disease like type 1 diabetes mellitus, chronic heart disease, multiple sclerosis, cognitive impairments and rheumatoid arthritis[4].

Sun exposure is one of the most important sources of vitamin D[5]. Ultraviolet rays in sunlight play its role in activation of vitamin D. The normal range required for this activation is 290nm to 315nm. The effectiveness of cutaneous synthesis depends on amount of melatonin in the skin[6]. Alternative to sunlight exposure is fat fish, cod liver oil and supplements[7]. During winter season vitamin D formation is insufficient due to low UV rays. The average serum vitamin D level in winter in one study was found to be 40-50 nmol/L while 70-80nmol/L in

summer[8]. Natural food has a very limited amount of vitamin D. meat has a small amount of vitamin D3. Some mild mushrooms contain a good amount of vitamin D2[9].

Vitamin D deficiency can lead to rickets in children and osteoporosis and osteomalacia in adults which is one of the leading causes of hip fractures in adult population. Its deficiency also can lead to myopathies and patient present with nonspecific Musculo skeletal pain and patient is at high risk for obesity and dermatitis[10,11]. According to endocrine society the serum vitamin D level of greater then 30nm/dL is considered as normal in adults and children while value of less than 30ng/dL is insufficiency and less then 20ng/ is considered as deficiency[12].

Buner is one of the districts of KPK Pakistan. Its latitude is 34.6 to 34.18 degree north and longitude of 72.48 to 72.5 degree east. Its elevation is from 1200ft to 9500ft. Buner has 4 seasons with summer and winter of equal duration. No data is available regarding average sunshine. Majority of peoples are poor with low socioeconomic status. Peoples wear traditional dress with full body cover with clothes. Previous studies suggest a high prevalence of vitamin D deficiency common population of Pakistan, although it is a global issue[13]. Up till now no study is conducted on Vitamin D level and its deficiency. Therefore, the study was carried out to determine the frequecy of Vitamin D deficiency in District Buner.

MATERIALS AND METHODS

This case series study was conducted during the period from Jan 2019 to Jun 2020 at Distict Head Quarter Hospital Dagar Buner which is a Category B Hospital with average outpatient of 80 per day in Orthopedic Department. A questionnaire with many variables including demography, clinical characteristics, and serum vitamin D levels was designed and informed consent was taken from all the patients.

In this study 149 patients were selected randomly with age above 15 years. Patients were randomly checked clinically, and serum vitamin D levels were measured. Patients with musculoskeletal pain, proximal myopathy, generalize body pain, non-traumatic bone tenderness, were included. Patients with malignancy, fractures, metabolic bone diseases, pregnancy, immobility of more than 1 weak, vitamin D supplementation and intestinal malabsorption's were excluded from the study. A proforma was design to mention name, age, gender, profession, any comorbidity. Venous blood was used for analysis with in 1 hour after drawn. Analysis was made at Diagnostic laboratory at Buner Medical Complex Dagar Buner by the same operator.

A cutoff value of less than 8ng/dL was considered as deficient, between 20ng/dl to 30ng/dl as insufficiency and a value of more than 30ng/dl was sufficient. Data was collected and analyze with SPSS 16 version.

RESULTS

A total data of 149 patients was analyzed (table1). 115 were females and 34 were males. Out of 149, 54 (36.2%) have sufficient, 25 (16.7%) have insufficient and 70 (47%) have deficient vitamin D levels.

Table 1: Demographic and clinical characteristics among the three groups of healthy volunteers (n=149)

		Sufficient n=54(36.2%)	**Insufficient n=25(16.7%)**	**Deficient n=70(47%)**	**P value**
Age groups	10 to 19 Years (n=18)	01(05.6%)	02(11.1%)	15(83.3%)	<0.001
	20 to 29 Years (n=53)	13(24.5%)	09(17.0%)	31(58.5%)	
	30 to 39 Years (n=46)	24(52.2%)	05(10.9%)	17(37.0%)	
	40 to 49 Years (n=23)	11(47.8%)	05(21.7%)	07 (30.4%)	
	50 to 70 Years (n=9)	05(55.6%)	04 (44.4%)	00(00.0%)	
Profession	Student (n=29)	04(13.8%)	05 (17.2%)	20 (69.0%)	<0.001
	Housewife (n=63)	29(31.2%)	15 (16.1%)	48 (51.6%)	
	Unemployed (n=5)	03(60.0%)	00 (00.0%)	02(40.0%)	
	Others (n=23)	18 (78.3%)	05 (21.7%)	00(00.0%)	
Gender	Male (n=34	21(61.8%)	08 (23.5%)	05 (14.7%)	<0.001
	Female (n=115)	33 (28.4%)	17 (14.7%)	65 (56.0%)	
Comorbidity	Diabetic (n=9)	04(44.4%)	01(11.1%)	04(44.4%)	>0.05
	Hypertensive (n=5)	03(60.0%)	01(20.0%)	01(20.0%)	
	Nil (n=135)	47(34.6%)	23(16.9%)	65 (47.8%)	

The most common population were housewives (62%). 9.3% were with comorbidities (6% diabetic and 3.3% hypertensive). The results clearly show the differences in Vitamin D sufficiency levels have no statistical significance with respect to comorbidity. While on other hand age, profession and gender has differences in Vitamin D level which have very statistical significance (P-value <0.001). Highest proportions of the Vitamin D deficiency are observed in age groups of 10-19 years and 20-29 Years that is 83.5% and 58.5% respectively. While more than half of the age groups above 39 are Vitamin D sufficient. While in profession groups highest proportion is for the students followed by housewives that is 69% and 51% respectively. While surprisingly unemployed and the persons with other professions are Vitamin D sufficient. Vitamin D deficiency is markedly observed in females as compared to males. More than half of all patients admitted to hospitals have pronounced VDD but the difference across the three groups is not statistically significant due to small sample size.

DISCUSSION

According to endocrine society, the serum Vitamin D_3 level of greater then 30nm/dL is considered as normal in adults and children while value of less than 30ng/dL is insufficiency and less then 20ng/ is considered as deficiency.

Vitamin D deficiency can lead to rickets in children and osteoporosis and osteomalacia in adults which is one of the leading causes of hip fractures in adult population. Its deficiency also can lead to myopathies and patient present with nonspecific Musculoskeletal pain and patient is at high risk for obesity and dermatitis[10,11].

The observed levels of vitamin D deficiency (VDD), insufficiency (VDI) and sufficiency (VDS) are comparable with past studies with larger sample size in Pakistan[11,14]. Due to small sample size in our population, there is marginal variation of deficiency estimates. Studies in women population have shown marked VDD in premenopausal that is below 45 years of age[15,16]. Similarly housewives or unemployed women were found to be in higher proportion to be VDD as compared to other profession groups and single females[15,16]. Earlier studies have shown almost similar results of VDD as in our study[17]. Even higher percentages of VDD have been reported among lactating females and their children in metropolitan cities[18]. The possible explanation for this VDD is the increase in metabolic demands of the mothers and the baseline fragile health condition of mothers and sub optimum nutritional intake. This results in VDD in both mother and infant.

More than half of the patients admitted to the hospital for various reasons were found to be VDD without any symptoms with higher proportions of females[19]. Obesity has been found to be prevalent in patients with severe VDD[19]. Study done in major city of Pakistan i.e., Karachi among asymptomatic individuals found no statistical significance between VDD and co-morbidity[2,15].

CONCLUSION

This study shows a high frequecy of VDD which is more observed in females as compared to male and in ages up to 30 years. There is need to raise awareness among the masses regarding VDD and preventive measures should be taken especially among females and adult population.

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