Level of Vitamin D3 in Patients suffering from Knee Osteoarthritis.

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Abstract

Background: Worldwide decrease in Vit D3 level is major health issue which result multiple health problem because it exerts many effect on extraescalator system, and also contribute in multiple metabolism like mineral , cartilage etc, So its deficiency results many degenerative, metabolic and also autoimmune disorders. Osteoarthritisis chronic, degenerative, progressive inflammatory disease which results irreversible disable joint. As its nature is degenerative & progressive so commonly fined in elder peoples either man or women, in advance stage due to distraction of cartilage and under line bone joints moments also restricted. **Objectives:** Aim of this research to analyse level of 1-25 di (OH) Cholecalciferol Vit D 3 in patients with knee osteoarthritis (KOA), establish correlations with laboratory findings. **Setting:** PUMHS department of orthopedics and medicine OPD. **Duration:** 1st June 2017-31st May 2018 **Design:** cross sectional. **Sample size:** 200. **Materials and Methods:** 25-OH vitamin D3/D2 levels were assessed in serum samples of 200 patients as follows: 180 OA patients, and 20 healthy controls. **Results:** Total patients of this study are 200 and controls;; the mean age of patients was 57.34SD+6.25 years, decreased serum vitamin D level were in 125(62,5%) subjects while sufficient levels were in 75(37.5%) participants of study. Vitamin D level was sufficient in 71 patients (49 male 22 female) and 4 (3male 1 female) controls, it was insufficient in 106 (73 male 33 female) patients and 16 (11 male 5 female) controls and deficient in 3 (2 male 1 female) patients no control was diffident in our data. **Conclusion:** We found that the levels of Vit. D in OA patients differed significantly from the healthy controls. We could suggest that vitamin D supplementation in OA patients would be of benefit for them.

Keywords: Osteoarthritis; vitamin D Deficiency, Vitamin D3.

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INTRODUCTION

Osteoarthritis (OA) is the most common health issue which result of disability in the older age group. Characteristic OA are pain, degenerative change in cartilage and nearby bone, with inflammation and decreased range of motion[1,2]. Extra axial joints commonly affected in older population but knee joint is commonest joint therefore KOA has higher influence in loss of life quality which results increased burden on individual, family& population. Along health care facilitator, Peoples > 65 age living in United State has about > 0.14 billion of population are suffering from advance knee OA and near half are less than 65 years [3].Osteoarthritis, is commonest musculature degenerative arthritis which effect both younger and elder group of population resulting handsome effect on individual and social cost which include dis comfort decrease working capacity due to restricted joint moments and painful life style, job loses so financially, socially and physiological disturbance develops, As KOA is degenerative disease so its progression resulting loss of structural and functional joint. Which are responsible for free joint

moment, this pathology mimics by various inflammatory processes with weakness of mussels, obesity, metabolic and some health problems are also responsible for these comorbidities. To get rid are decreased characteristics KOA , Vit D is major component which contribute its role in both boney as well as cartilage metabolism so restricted structural and functional loss. Recently this topic is under debate unfortunately. 4 – 9 But with no definitive conclusion being reached. 10

Vit D level is directly proportional to life quality in either way so its deficiency resulting poor life quality due to pain and functional disability. [11]

Decrease serum level of 1, 25 di (OH) Cholecalciferol Vit D 3 is also seen to responsible for other health related issues. It is major responsible factor for fall in old people. [12. 13]

As we all knows that due to decrease plasma level o of vit D musculoskeletal pain , tiredness, lassitude , fatigue changes in walking pattern even up starring , difficult squatting etc. if this happened in elder people than totally loss of daily living style, so called active daily living disability (ADL)[14].

On this background, we aimed to investigate the levels of Vitamin D in cross sectional of patients with KAO to establish correlations

This study will help early identification and proper treatment may reduce the morbidly and mortality.

Material and Methods

Subjects of this research are 200 individuals which were recruited in our study as follows:

Objectives:

Aim of study was to analyze the levels of Vitamin D 1, 25 di (OH) Cholecalciferol level in patients with Osteoarthritis (OA) to establish correlations with some demographic and clinical, laboratory and instrumental findings.

Setting: PUMHS outdoor department of orthopedics

Duration: 1st June 2017- 31st May 2018

Design: cross sectional

Sample size: 200

Operational definitions:

Vitamin D3 deficiency:

It based on laboratory report of individual patients with KAO .

> 30 ng/ml is sufficient,>20 and <30 ng/ml insufficiency and deficiency < 20 ng/ml [15]

Data collection:

After completion required tools, study conducted at people's medical college hospital Nawabshah. This study is cross-sectional type which conducted on **200** individuals who attended the outpatient department for management of KOA osteoarthritis in men and women from 1st June 2017- 31st May 2018. The individual were divided into two groups; of 20normal subjects as control and 180 abnormal with KOA patients

Data was collected on pre designed proforma: each individual verbally informed and written consent taken before in listing in study. Individuals who finishes given questioners blood sample were taken by laboratory technician for required analysis and all information were recorded .Results of analysis were entered in proforma and simultaneously in between relation checked

The taken sample sent to laboratory to assess level of 1, 25 di (OH) Cholecalciferol Vit D 3 by available machine (Mini Vidas Biomerieux Global Company France).

Levels > 30 ng/ml sufficient,>20 and <30 ng/ml insufficiency and deficiency < 20 ng/ml

Data analyses:

Major object to analyze the level of 1, 25 di (OH) Cholecalciferol Vit D 3 is individual suffering from KOA through SPSS version

20. In this study categorical variables are computed by percentage & frequency like patients and Vit D & qualitative and quantitative variables were calculated as mean ±standard deviation and median frequency and percentage for Vit D. T test one way anova used for comparison, correlation between parameters analyzed by Pearson. KAO with different parameters assessed by influence on its outcome, Age is used for significant of Vit D3 level statistically significant is <0.05 P value distinction ratio visualized by chi-squre test. By bivariate correlation analyzer is used to assess relation between Vit D and KAO. **Inclusion Criteria:** all man and women's individuals with KOA older than 40 years **Exclusion Criteria:** patients with other known etiologies of osteoarthritis except degenerative, blood diseases, malignancies, myopathies, metabolic diseases, taking drugs, renal failure, chronic liver diseases, pregnant ladies, over weight and obesity.

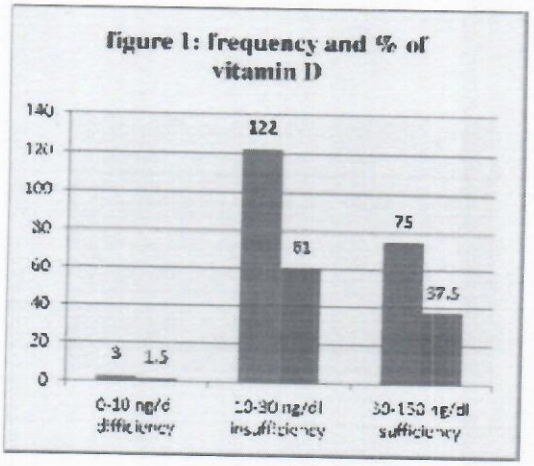
Results:

Table 1: Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
age in years	200	30.00	45.00	75.00	57.3450	.44199	6.25071
level of vitamin D in blood	200	77.50	8.00	85.50	27.4755	1.51375	21.40771
Valid N (listwise)	200						

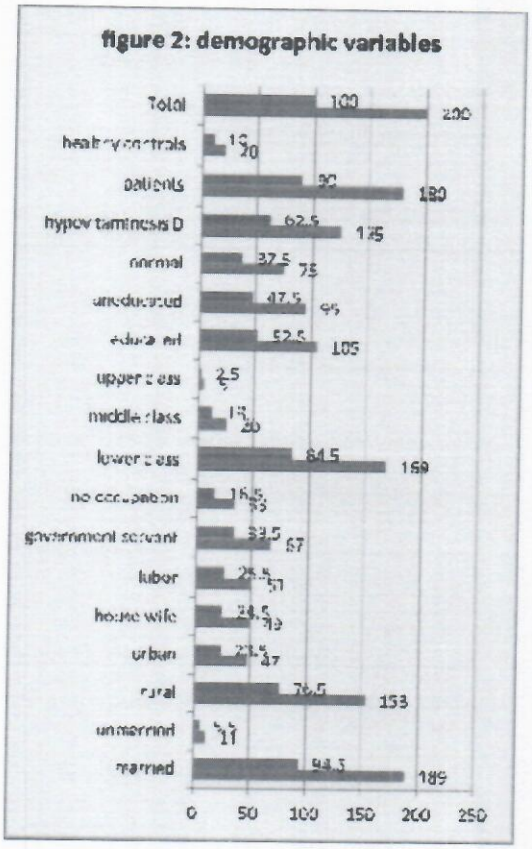
Descriptive Statistics

There were a total number of 200 patients and controls; the mean age of subjects was 57.34SD+6.25 years, minimum 45 and maximum 75 years. **Table 1:**



Frequency and % of vitamin D

Low levels of 1, 25 di (OH) Cholecalciferol Vit D 3 were in 125(62,5%) subjects while sufficient levels were in 75(37.5%) participants of study. **figure 1:**



Demographic variables

There were 20 (10%) healthy controls while 180(90%) osteoarthritis patients, Low levels of vitamin D were in 125(62,5%) subjects while sufficient levels were in 75(37.5%), 95(47.5%) were uneducated while 105(52.5%) were educated, 169(84.5%), 26(13%) and 05(2.5%) were from lower, middle and upper class respectively.33(16.5%), 67(33.5%), 51(25.5%) and 49(24.5%) were no occupation, government servant, labor and house wives respectively. there were 47(23.5%) from urban setup and 153(76.5%) from rural side. Out of 200 11(5.5%) were unmarried while 189(94.5%) were married.

Figure 2:

Subjects * gender * vitamin D range Crosstabulation

Vitamin D level was sufficient in 75 patients and controls p=0.64, it was insufficient in 122 patients and controls p=0.000 and deficient in 3 patients no control was diffident in our data Vitamin D level was sufficient in 71 patients and 4 controls; it was insufficient in 106 patients and 16 controls and deficient in 3 patients no control was diffident in our data Vitamin D level was sufficient in 71 patients (49 male 22 female) and 4 (3male 1 female) controls, it was insufficient in 106 (73 male 33 female) patients and 16 (11 male 5 female) controls and deficient in 3 (2 male 1 female) patients no control was diffident in our data. Different percentages are shown in table 2.

Vitamin D and demographic parameters (paired sample tests)

In relation to semen parameters and vitamin D levels paired sample test was performed with mean and SD, upper and lower limits, with 95% confidence interval as shown in table 3, the p-value was statistically significant vitamin D level with age in years (0.000), gender(0.000), marital status(0.000),address(0.000), occupation (0.000),dead sperms(0.000),socio-economical status (0.000),education(0.000) and subjects of study(0.000).table 3.

Table 4.Correlation of demographic variables There was valid relation of among different variable in patients suffering from osteoarthritis with demographic variables. Gender was statistically notably connected with marital status, occupation and socio-economical class, while other variables of study had significant correlation with each other as shown in the table. Table 4.

Discussion:

KOA is chronic degenerative progressive irreversible type of arthritis, which leads to major health issue worldwide, round about near to 0.14 billion individuals at US suffering from KOA in older age about > 65 years & half of in young adults in between 45 to 64 years. Initially according available literatures and data shows that KAO is consequence of wear and tear of intra articular cartilage but know a day it assumes that its consequence of not only degenerative changes but also cytokine-mediate cellular changes which results not only distraction of cartilage but also underline bone.Although decrease level of 1, 25 di (OH) CholecalciferolVit D 3 are reported in elderly with are without KAO, Symptoms of musculoskeletal health problem in old age is directly proportional to deficiency of 1, 25 di (OH) Cholecalciferol Vit D 3 . After consumption of adequate dose of 1, 25 di (OH) Cholecalciferol Vit D 3, One can increase serum concentration of 1, 25 di (OH) Cholecalciferol Vit D 3 to improve physical health. Theories and experienced reveals that vit D has very important role in musculoskeletal activity in old as well as young peoples, it is not experimentally proved that additional supplements of 1, 25 di (OH) Cholecalciferol Vit D 3 directly influence to KOA beside strengthen the muscular system around it, furthermore it is essential that supplements is required to improve physical health by muscular strength. As it is known that KAO is a chronic

Table 2: subjects * gender * vitamin D range Crosstabulation							
vitamin D range				gender		Total	Pearson Chi-Square
				male	female		
0-10 ng/dl deficiency	subjects	patients	Count	2	1	3	0.[a]
			% of Total	66.7%	33.3%	100.0%	
	Total		Count	2	1	3	
			% of Total	66.7%	33.3%	100.0%	
10-30 ng/dl insufficiency	subjects	patients	Count	73	33	106	.000[b]
			% of Total	59.8%	27.0%	86.9%	
		healthy controls	Count	11	5	16	
			% of Total	9.0%	4.1%	13.1%	
	Total		Count	84	38	122	
			% of Total	68.9%	31.1%	100.0%	
30-150 ng/dl sufficiency	subjects	patients	Count	49	22	71	.064[d]
			% of Total	65.3%	29.3%	94.7%	
		healthy controls	Count	3	1	4	
			% of Total	4.0%	1.3%	5.3%	
	Total		Count	52	23	75	
			% of Total	69.3%	30.7%	100.0%	

Table 3: Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
level of vitamin D in blood - age in years	-29.86950	22.59988	1.59805	-33.02079	-26.71821	-18.691	199	.000
level of vitamin D in blood - gender	26.16550	21.40864	1.51382	23.18031	29.15069	17.284	199	.000
level of vitamin D in blood - marital status	26.42050	21.40086	1.51327	23.43640	29.40460	17.459	199	.000
level of vitamin D in blood - address	26.24050	21.48310	1.51908	23.24493	29.23607	17.274	199	.000
level of vitamin D in blood - occupation	25.05550	21.30665	1.50661	22.08453	28.02647	16.630	199	.000
level of vitamin D in blood – socio-economical class	26.29550	21.41622	1.51436	23.30926	29.28174	17.364	199	.000
level of vitamin D in blood - education	26.00050	21.44863	1.51665	23.00974	28.99126	17.143	199	.000
level of vitamin D in blood - subjects	26.37550	21.44024	1.51605	23.38591	29.36509	17.397	199	.000

Table 4: Correlations

		Age In Years	Gender	Marital Status	Address	Occupation	Socio-Economical Class	Education	Vitamin D Level	Level Of Vitamin D In Blood	Vitamin D Range	Subjects
Age In Years	Pearson Correlation	1	.135	-.038	-.046	.257**	-.111	.073	.036	-.050	-.042	.147*
	Sig. (2-tailed)		.057	.593	.520	.000	.118	.307	.610	.482	.553	.037
Gender	Pearson Correlation	.135	1	.360**	-.091	.691**	.604**	.120	.006	.009	-.007	-.007
	Sig. (2-tailed)	.057		.000	.200	.000	.000	.090	.937	.901	.924	.919
Marital Status	Pearson Correlation	-.038	.360**	1	-.030	.327**	.248**	.034	.006	.035	.002	-.080
	Sig. (2-tailed)	.593	.000		.671	.000	.000	.632	.937	.620	.981	.258
Address	Pearson Correlation	-.046	-.091	-.030	1	-.089	-.065	.134	.113	-.168*	-.137	-.028
	Sig. (2-tailed)	.520	.200	.671		.213	.359	.059	.112	.018	.053	.699
Occupation	Pearson Correlation	.257**	.691**	.327**	-.089	1	.620**	.127	-.145*	.122	.140*	.010
	Sig. (2-tailed)	.000	.000	.000	.213		.000	.073	.040	.086	.048	.892
Socio-Economical Class	Pearson Correlation	-.111	.604**	.248**	-.065	.620**	1	.110	.035	-.009	-.021	-.060
	Sig. (2-tailed)	.118	.000	.000	.359	.000		.120	.624	.903	.766	.399
Education	Pearson Correlation	.073	.120	.034	.134	.127	.110	1	.034	-.070	-.043	.017
	Sig. (2-tailed)	.307	.090	.632	.059	.073	.120		.637	.324	.544	.815
Vitamin D Level	Pearson Correlation	.036	.006	.006	.113	-.145*	.035	.034	1	-.862**	-.971**	.120
	Sig. (2-tailed)	.610	.937	.937	.112	.040	.624	.637		.000	.000	.089
Level Of Vitamin D In Blood	Pearson Correlation	-.050	.009	.035	-.168*	.122	-.009	-.070	-.862**	1	.844**	-.101
	Sig. (2-tailed)	.482	.901	.620	.018	.086	.903	.324	.000		.000	.154
Vitamin D Range	Pearson Correlation	-.042	-.007	.002	-.137	.140*	-.021	-.043	-.971**	.844**	1	-.105
	Sig. (2-tailed)	.553	.924	.981	.053	.048	.766	.544	.000	.000		.141
Subjects	Pearson Correlation	.147*	-.007	-.080	-.028	.010	-.060	.017	.120	-.101	-.105	1
	Sig. (2-tailed)	.037	.919	.258	.699	.892	.399	.815	.089	.154	.141	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

progressive degenerative and irrecoverable kind of arthritis which altered life style with time, as exposed to risk factors, Remission /cure of these structural changes needs long term follow up with medicine and physiotherapy, sometime in advanced stage surgical intervention is also required.

Therefore short term clinical trials are insufficient to establish for complete structural improvement by using any kind of imaging like MRI and X ray. Beside altered behavior between symptoms and structural changes in KOA makes too hard to diagnose or assess the recovery in any individual, Poor consumption decrease 1, 25 di (OH) Cholecalciferol Vit D 3 or Vit D deficiency may restricted physical activity resulting altered bone and cartilage metabolism by Impairing Ostia plastic activity which finally enhance the risk or accelerate in degenerative process KOA [16]. A systematic review and meta-analysis of 81 observational studies

with 50 834 participants found significantly lower serum 25(OH)D in individual with multiple musculoskeletal complain like myalgia, arthritis, and journalized hacks& pains as compared with control group [17].

Another meta-analysis of 12 patients shows relationship between decresed1, 25 di (OH) Cholecalciferol Vit D 3 particularly below the level of 8-10 ng/ml with journalized pain .[18]

In other cross study patients with decreased level of 1, 25 di (OH) Cholecalciferol Vit D 3 < 15 ng/ml having more risk of mileage , fatigue , creams and axil pain compared with other group those have sufficient1, 25 di (OH) Cholecalciferol Vit D 3 [19]

Decrease level f Vit D associate new OA and other joint also shows in literature [20].All physical activities including aerobics, walking, climbing and journal strength of musculoskeletal decreased in all those elders who have decreased level of 1, 25 di (OH) Cholecalciferol Vit D 3 [21].

One other large cross sectional and longitude design with three year follow u of 1234 patients belong with both gender age more than > 65 year shows that decreased serum level of 1, 25 di (OH) Cholecalciferol Vit D 3,< 10 ng/ml is responsible for developing poor physical activity in future [22]

The outcome of different studies conducted at different centers to analyze relation between 1, 25 di (OH) Cholecalciferol Vit D 3 and imaging abnormality are conflicting the reason for that is population & there life style which altered base line level of 1, 25 di (OH) Cholecalciferol Vit D 3 , so the result are difference unmatched with each other.

Relation of decreased level of 1, 25 di (OH) Cholecalciferol Vit D 3 with progression KOA is observed in four different studies along progression of KOA in medial compartment is more than those individual who has normal level [23.24.25.26]

Meta-analysis of four above mentioned (RCTs) by Gao et al, which listed total number of individual 1136 shows that level of 1, 25 di (OH) Cholecalciferol Vit D 3 increase by 17.58 nmol/L in Vit D group and tapered by 5.7 nmol/L in other placebo group. Results occurred that additional 1, 25 di (OH) Cholecalciferol Vit D 3 usage in daily routine doze 2000 IU/Unit can enhance its level which responsible mark ably improved all physical aspects & altered its functional outcome by healing of tibia cartilage [27]

One other meta analyze of similar study by Diao et at finalized parallel result [28]

None the less result of systemic review RCTs that consist 189 participated aged 45 year and older in result of 1, 25 di (OH) Cholecalciferol Vit D 3 varies in KOA [29]

In clinical trial of decreased VIt D level in KOA along with its symptoms like effusion and synovitis additional usage of Vit D supplement tapered the progression of all its symptoms [30]

In other RCT of 60 individual with active disease of KOA which were taken 800 IU of Vit D daily (25 individual) and 26 on placebo for 2 year . The MRI reveals no significant changes in synovial tissue volume and subchondral BMIs

Insufficient sample size decrease daily short term treatment are major drawback of this study, only small proportional of participant had 1, 25 di (OH) Cholecalciferol Vit D 3 deficiency [31].

Considerably decrease Vit D of also seen in various other systemic disease which were conducted in our study like Parkinson, male infertility, Tuberculosis's [32][33][34]

Conclusion

Taken together, our results showed significantly lower mean serum level of 1, 25 di (OH) Cholecalciferol vitamin D3 in a degenerative disease, such as KOA, whereas the mean levels in OA patients and healthy controls were interpreted as sufficient. We

could suggest that vitamin D supplementation in OA patients would be of benefit for them.

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Author Contributions

All authors contributed to preparation of manuscript, revision, as well as review of final revised paper.

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