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Study of vitamin D3 and vitamin B12 Levels in general population in Kharghar a new age city with mixed population

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Abstract
Kharghar is new age city with good healthcare facilities, schools and colleges, green and clean surroundings with open spaces. Even though sunshine vitamin D is available in plenty, a small percentage of the population takes advantage. Study involves children and adults (n=200). Every patient enrolled in the study is tested for Vitamin D3 and Vitamin B12 tests. Consent for testing the samples are taken by written form in the language patient understands. Methods used for testing are CLIA/ELISA. Results show that majority of the patients (>70%) are Vitamin D3 deficient and many (>30%) are Vitamin B12 deficient. Need for citizens to get exposed to adequate sunlight to have a normal Vitamin D3 naturally produced in their body. Vegetarians to consume food containing Vitamin B12 or fortified food with B12. Regular health check is required along with the blood tests to know the vitamin levels. Need for taking supplements as per physician's prescription to maintain vitamins levels to avoid health related issues.

Keywords: vitamin D3, vitamin B12, chemiluminescence assay (CLIA), sunlight, fortified food

1. Introduction

Kharghar is a new age city with many open spaces, planned city with green and clean societies and good healthcare facilities. This study aims at studying the levels of Vitamin D2 and B12 in a mixed population. The city of Kharghar is with many educational institutions, no liquor zone, upcoming Navi Mumbai Metro and international airport makes it a sought after residential destination for citizens who wants to keep healthy.

Vitamin D is freely available when we are exposed to sunlight. Our skin produces it when we are exposed to 15 minutes to 30 minutes for a day and 3-5 days in a week should be able to produce enough vitamin D. Earlier days as there were no modes of transportation, everyone used to walk in the sun by which naturally they use to get the Vitamin D. Now-a-days due to better transport facilities humans prefer different modes of transport to avoid Sun. Most of the office goers, businessmen, IT professionals, Doctors, engineers in different a specialties sit in AC/non AC offices and become the victims of Vitamin D3 deficiency.

The normal range for Vitamin D3 is >30ng/ml, 20-30ng.ml is insufficiency and <20 n Vitamin D3 deficiency may cause joint pains, bone pain, unexplained vague pain of upper and lower limbs etc. g/ml is deficiency. >100ng/ml can be toxic. Vitamin D is a steroid with hormone like activity [1]. Vitamin D3 deficiency may cause joint pains, bone pain, unexplained vague pain of upper and lower limbs etc.

Vitamin B12, mainly a dietary vitamin and deficiency of these are mainly in vegans or in individuals who have issues of absorbing the vitamins from the stomach/intestine. Vitamin B12 deficiency is also a major concern of the urban population. Study conducted in Mumbai includes company executives show that 65% are Vitamin B12 deficient [2] which is alarming. Vegetarians and elderly are at higher risk of Vitamin B12 deficiency [3].

Animal products and poultry, milk and milk products are a good source of Vitamin B12.Vegetarians are dependent on breakfast cereals fortified with Vitamin B12. Vitamin B12 is usually present as cyanocobalamin in dietary supplements

In Vitamin B12 less than 180ng/L is considered as deficient and 150-400ng/L is considered borderline according to Mayo laboratories reference values for vitamin B12 are 180-914ng/L.

A study in Indian journal of Medical research study suggests that 35% of the participants consume multivitamins supplements [4] and subjects consumed multivitamins. Blood tests showed significant higher Vitamin B12 levels, although it's a study comprising elderly population with mean age of the participants being 66.3 years. This clearly indicates supplements give extra dose of vitamins than RDA, which may not be appropriate in some individuals.

Pernicious anemia is a common cause of megaloblastic anemia throughout the world [5] and dietary vitamin B12 deficiency is a severe problem in the India subcontinent. Vitamin B12 is usually present a cyanocobalamin in dietary supplements. Animal products and poultry, milk and milk

products are a good source of Vitamin B12.vegetarians are dependent on breakfast cereals fortified with Vitamin B12. Dementia, is a common problem of the old age which may not take much social or personal attention as it is believed that much cannot be done for this, which when treated may increase health expenditure. Deficiency of the B vitamins (folate, Vitamin B6 and Vitamin B12) may play a role in cognitive impairment in the elderly through hyperhomocysteinemia [6].

Even though in tropical country like India reports of >50% of the population is Vitamin D defecient [7]. The usual dietary sources of Vitamin B12 are animal-derived foods, although a few plant based foods contain substantial amounts of Vitamins B12 [8].

2. Materials and methods

A total of 200 samples are tested for Vitamin D3 and B12 as per the plan of the study. Patients consent forms are collected by explaining the aim of the study and they were explained well by the language they understand. (Marathi/ Hindi/ English).

General population (age group included 12 years to 70years both males and females randomly selected) is selected to get a better picture of the area, Vitamin D3 and Vitamin B12 instead of selecting only executives.

Blood samples were collected from all the patients by taking aseptic precautions and transferred to serum vials. (Gel tubes-red cap). Once the blood is clotted, all the samples were centrifuged for 3000 RPM (revolutions per minute) for 5 minutes. All the samples are subjected to CLIA (Chemiluminescence immuno assay) and repeated few samples with CLIA/ELISA tests which are above or below the normal range (10 samples).

The test samples were tested along with known positive control and known negative controls for maintaining and checking the quality control.

Results are evaluated for statistical significance.

3. Results and tables

Table 1: Common complaints for Vitamin D3 & Vitamin B12

Sl no	Vitamin D3	N=200	Vitamin B12	N=200
1	Joint pain/muscle pain	50	Atrophic gastritis	34
2	Knee pain	30	Pernicious anemia	34
3	Lethargic feeling	34	Graves /SLE/Chrons disease	14
4	Tired ness/giddiness	34	Tiredness/weakness	36
5	Pain while exercise/walking	32	Numbness/tingling	30
6			Anemia (Others)	28
8	No symptoms	20		24

Among 200 patients 150 patients complained of general symptoms are tested (75 %) and 50 % (25) were visited doctors for a general annual health checkup. Among them 46 (23%) patients wanted to know the levels of Vitamin B12 and Vi D3 and they are aware of the situation in general.

In Vitamin D3 deficient patients, commonest problem especially elder individuals are joint and muscle pain (25%), knee pain lethargic feeling tiredness, giddiness, pain while the worked, walked or gimming etc. (16%). 10% of the patients were not having any symptoms and still showed vitamin D3 deficiency. Most of the patients who are pure vegetarians (68%) are found to be Vitamin B12 deficient. Although <10% of the non-vegetarians too are found to be vitamin B12 deficient, however absorption, intrinsic factors may be the reason which needs evaluation/consultation from Gastro-enterologist/endocrinologist. Atrophic gastritis, pernicious anemia, Graves' disease, SLE, tiredness, general weakness being a common problem for both the Vitamin deficiencies, numbness and tingling sensation and anemia were one of the important findings particularly in female patients.

Table 2: Dietary sources of Vitamin D3 & B12

Sl. No	Source of Vitamin D	Source of Vitamin B12
1	Fishes(Salmon)	Chicken
2	Fish liver Oil(Cod)	Salmon/Mackerel
3	Egg yolks	Trout
4	Fortified Milk	Tuna
5	Fortified Cheese/milk products	Clams
6		Eggs
7		Liver-Beef
8		Milk
9		Yoghurt
10		Cheeses
11	Others	Soya products, cereals

There is no much food options for vegetarians but can increase the general measures or fortified products can be a better option. Many of the patients (23%) Vitamin B12 was higher than the normal value. It is found out that these are on a regular supplement.

Table 3: Table showing male female ratio and other parameters of the study group.

Sl No	Study group	Numbers n=200
1	Adults	100
	Males	41
	Females	59
2.	Adolescents/children	100
	Males	45
	Females	55
3	Food consumed	200
	Vegetarians	85
	Non vegetarians	25
	Mixed beg/non veg	90
4	Contact with the sunlight/outdoor activity	
	Yes	65
	No	135
5	Supplements for Vit D	58
6	Supplements /injection for Vit.B12	75
7	Gym/other indoor exercises	65
	No activity	47
	Some sort of exercise including Yoga	25
8	Active smoking	23
9	Do not fit into any group	07

Statistical analysis: p value in the range of 0.95 to 0.975 between 0.9 and 0.9 Average = 0.925

At 5% LOS (Level of Significance), Value of Chi Square for 5 degrees of freedom is 11.07

Calculated value is less than table value ==> Hypothesis H0

Null Hypothesis
H0: There is no ssociation between sex and disease

Alternate Hypothesis Ha: There is association between sex and disease

Table 4: Number of patients who are Vitamin D3 and Vitamin B12 deficient

Sl No		Adults n=100				Children/Adolescents n=100				Total 200	
		Males		Females		Males		Females			
1.	Patients enrolled blood tests done	41		59		45		55		200	
2.	Deficiency of	Vit D3	Vit B12	Vit D3	Vit B12	Vit D3	Vit B12	Vit D3	Vit B12	Vit D3	Vit B12
3.	Number of pateints deficient	30	17	41	27	31	16	40	18	142	75
4.	%	73.17	41.46	69.49	45.76	68.88	35.55	72.72	32.72	71	37.5

Above table confirms that 71% of the study population is Vitamin D3 deficient and 37.5 % of the population is Vitamin B12 deficient.

Among adult males 73.17 % are vitamin D3 deficient as compared females which is 69.49% and 41.46 % of males in comparison with female patients which is 45.76%. In Children and adolescents too are deficient i.e., 68.88% males and 72.72 % females in Vitamin D 3and 35.55 % males and 32.72 % of females are deficient in Vitamin B12.

4. Discussion

Awareness of Vitamin deficiency is better in India now. Citizens of Kharghar need to make use of natural resources like sunlight for Vitamin D which is available in plenty to avoid symptoms due to the deficiency of Vitamin D3. One of the Times news network study done by Kalpana Sharma shows that 7 out of 10 are deficient for Vitamin D (81.28 %), and 15.06 % of the samples tested were vitamin B12 deficient. The testing of these vitamins itself suggests the need to expose themselves to sun which in turn help their body to produce more Vitamin D3.

Vitamin B 12 deficiency also is a major concern of the vegetarians although a small number of non-vegetarians too are deficient to vitamin B12. Only 32.5 % (65) of the study population (N=200) is exposed to sunlight as per record.

For vitamin D3, its preferable to go out during sunlight and get adequate sunlight. Use half shirt than full shirt, if you cannot walk at least sit in open (sunbathing) so that you are exposed to the sun. Tropical countries like India has enough sunlight which helps the Vitamin D production naturally in the skin/body. Everyone should be taught to get it adequate to avoid health related issues due to deficiency. Vitamin B12 deficiency is major concern of the vegetarians, they need to take more of vitamin B12 containing food.

5. Conclusion

71% of the study population is Vitamin D3 deficient and 37.5 % of them are vitamin B12 deficient.

Do not self-medicate and follow dosage given by the Physician and if you are taking Vitamin D orally/IM, need to check blood on a regular basis (at least once in 6 months) as to know the values, increase in Vitamin D level may cause toxicity. Vegans definitely need to have fortified food to improve their Vitamin B 12 levels.

Although there no much variation in deficiency levels in adults and adolescents and children above 12 years of age.

As this a study of only 200 patients, bigger data/more study population will give better picture if the status of the vitamin deficiencies.

Conflict of interest: NIL

6. References

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