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Research Article

PREVALENCE OF VITAMIN D/B12 DEFICIENCY AMONG URBAN POPULATIONS COMPLAINING PAIN OF LOWER LIMB AND GENERALIZE WEAKNESS

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ABSTRACT

Objective: The current study was carried out to assess the prevalence of vitamin D/B12 deficiency among urban populations complaining pain of lower limb and generalize weakness.

Methods: A cross-sectional study was conducted in a sample of 188 men and women of different age who attended private tertiary care hospital for the complaint of pain in lower limb and have generalize weakness. A brief questionnaire was designed to obtain the information such as age, type of diet, outdoor physical exercise and intake of alcohol or smoke. Blood samples were collected for vitamin D and B12 analysis.

Results: The majority (57.4%) of the participants had vitamin D deficiency or insufficiency (< 20 ng/ml) and 48.4 % of subjects had vitamin B12 deficiency (< 198 pg/ml). In our results the prevalence of both vitamin D/B12 deficiencies appears to increase with the age. Risk factors such as age, diet and smoke (cigarette consumption) were significantly associated with vitamin D/B12 deficiency (p=0.001). Unlike vitamin B12, outdoor physical exercise was significantly associated with vitamin D status (p=0.001).

Conclusion: The findings of this study report high prevalence of vitamin D/B12 deficiencies among urban populations complaining pain of lower limb and have generalize weakness. A vegetarian diet, cigarette smoking seems a strong risk factor for vitamin D/B12 deficiencies. Our study emphasizes the need of regular monitoring of these two micronutrient status so that appropriate intervention programs can be implemented to address this problem

Keywords: Vitamin D, Vitamin B12, India.

INTRODUCTION

Today, the biggest health issue challenging by developing as well as developed countries are to decrease the load of two most common nutritional deficiency, i.e., Vitamins D and B-12. Emerging evidence from the research studies reports that Vitamin D is not only required for bone health but also requisite for the body to perform other physiological functions including cell differentiation, proliferation, insulin production, and immune functions [1]. Thus, the inadequate status of Vitamin D is associated with several disorders such as type 1 diabetes, cardiovascular diseases, cancers, depression, etc. [2-4]. The other nutrient, Vitamin B-12 also known as the energy Vitamin, is required for the formation of red blood cell and function of the nervous system. Research conducted on mice has linked poor Vitamin B12 to impaired growth and less formation of osteoblast cells [5]. Recent evidence from the observational studies revealed that low Vitamin B12 may increase the risk of bone/osteoporotic fracture in older men and rapid hip bone loss in older women [6-8].

Lack of prominent signs and symptoms of these two Vitamin deficiencies may be the one of the possible reasons for the increasing prevalence worldwide. In addition, due to long indoor hours of working, urban populations are being greatly experienced with the ambiguous complaint of generalized weakness and pain of the lower limb. Owing to less indication of these deficiencies, regular monitoring of serum Vitamin D and B-12 level in these people has not been in general practice till date.

The present study was conducted to assess the incidence and pattern of Vitamin D deficiency in combination with Vitamin B12 deficiency among urban populations who visited a tertiary care hospital with the complaint of pain in the lower limb and had generalized weakness.

METHODS

The present cross-sectional study was conducted in a sample of 188 men and women who attended tertiary care hospital for the complaint of pain in lower limb while walking and have generalized weakness/ feeling of apathy during all day. Subjects were selected randomly and voluntarily participated in the study. A brief questionnaire was designed to obtain the information such as age, type of diet, outdoor physical exercise, and intake of alcohol or smoke. Those who were taking vitamins and vitamin-mineral supplements were excluded from the survey. All participants were asked to get their Vitamins D and B-12 done from the NABL accredited laboratory. Vitamin D was

Table 1: General characteristics of the study participants

Characteristics	Frequency N (%)
Gender	
Male	99 (52.6)
Female	89 (47.3)
Study groups (years)	
Adolescence (10-19)	17 (9.1)
Adults (19-65)	146 (77.6)
Elder (>65)	25 (13.3)
Diet	
Vegetarian	106 (56.3)
Non-vegetarian	82 (43.6)
Exercise (outdoors)	
Yes	86 (45.7)
No	102 (54.2)
Smoke	
Yes	42 (22.3)
No	146 (80.2)

analyzed in serum by chemiluminescence enzyme immunoassay, and B-12 was measured in serum by electrochemiluminescence method. All participants presented their lab reports within 1 week of the survey, and results of Vitamin D and B-12 were recorded in survey questionnaire performa. Statistical analysis was performed using STATA. Descriptive statistics were used to characterize the study population. Frequency tables were constructed and presented as percentages. The Chi-square test was done to compare frequencies between groups. The $p<0.05$ was considered significant. The study procedures were conducted following the approval and guideline of the Ethical Committee of Amity University.

RESULTS

The study cohort consisted of the total of 188 males and females. Table 1 describes the general characteristics of study participants.

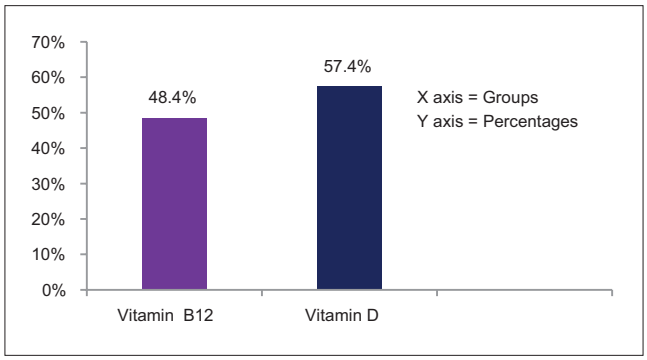

Fig. 1: Prevalence rate of Vitamin D/B12 deficiencies in study participants

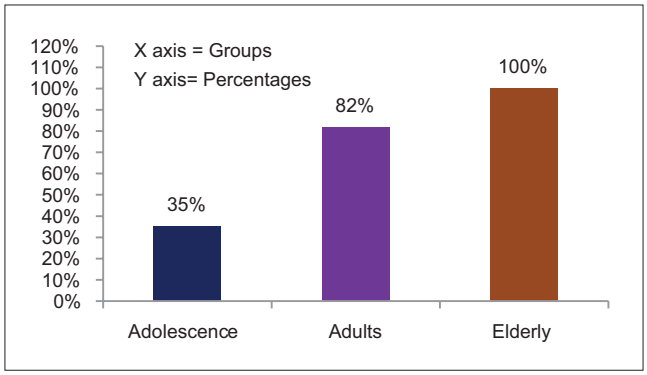

Fig. 2: Prevalence of Vitamin B12 deficiency across age groups

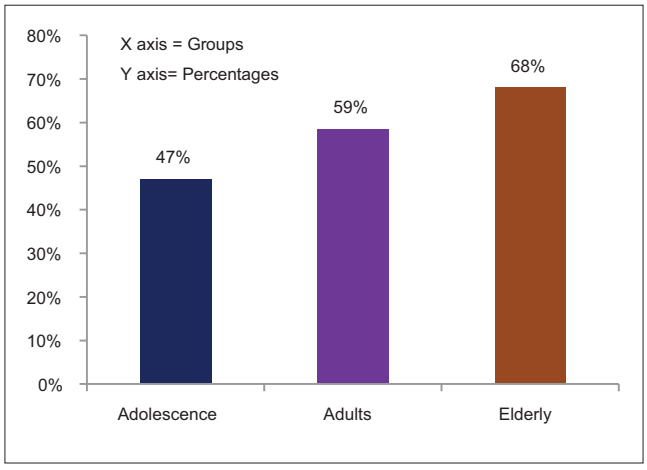

Fig. 3: Prevalence rate of Vitamin D deficiency across age groups

The study participants were characterized into three groups. The adolescence group included 17 participants, adult group included 146 participants, and 25 individuals were participated in elder group. The mean age of participants in adolescences group was 15.5 years, and mean age of adults and elders were 41.4 years and 70.8 years, respectively. The majority (56.3%) of the participants had vegetarian diet and not involved in any outdoor exercise (54.2%). Only 22.3% of the male participants were involved in cigarette smoking.

Fig. 1 shows the prevalence rate of Vitamin D/B12 deficiencies in overall study subjects. The majority (57.4%) of the participants had Vitamin D deficiency or insufficiency (<20 ng/ml), and 48.4% of subjects had Vitamin B12 deficiency (<198 pg/ml).

To study the pattern of Vitamin B12/Vitamin D deficiencies across age groups, we also analyzed the prevalence of Vitamin D and Vitamin B12 deficiencies among study groups. Fig. 2 shows that 35% of the adolescences were Vitamin B12 deficient. The percentage increased with the age (82% in adults and 100% in elderly group).

Similarly, Fig. 3 shows the prevalence of Vitamin D deficiency across age groups. 47% of the adolescences were Vitamin D deficient. The mean Vitamin D levels in adolescences were10.4 ng/ml. In contrast, 59% adults and 68% elder had Vitamin D deficiency (8.6 ng/ml and 13.2 ng/ml, respectively).

We performed regression analysis to determine the factors that can be associated with Vitamin D and Vitamin B12 deficiencies. Factors, such as age, diet, and smoke (cigarette consumption), were significantly associated with Vitamin B12 deficiency (p=0.001). However, no association was found with sex and physical exercise outdoors. The deficient Vitamin B12 level was found in 91 participants of which 83% had vegetarian diet, and only 16% had a non-vegetarian diet. Of those who consumed cigarette, 78% were found to be Vitamin B12 deficient.

Similarly, a significant association has been found between Vitamin D status and diet and smoking. Vitamin D deficiency was found in 108 participants, of whom 67% were vegetarians and 31% males were cigarette smokers. Unlike Vitamin B12, outdoor physical exercise was significantly associated with Vitamin D status. Of the individuals who were not involved in any physical exercise, outdoor, 82% had low Vitamin D level (<20 ng/ml). Furthermore, the level of Vitamin B12 and Vitamin D found to be decreasing with the increase of age.

DISCUSSION

Our study of random samples reports a high prevalence of Vitamin D/B12 deficiency in the urban population who attended tertiary care hospital with the complaint of the pain of lower limb and had generalized weakness. Consistent with the previous studies, the prevalence of both Vitamin D/B12 deficiencies in our study appeared to increase with the age and was higher among elderly people [9-11]. However, unlike the other studies the mean serum level of Vitamin D/B12 was not significantly differed between males and females in our findings [12].

Vitamin B12 is needed for energy production and body's genetic material. Deficiency of Vitamin B12 leads to a variety of conditions such as anemia, genetic disorder, hyperthyroidisms, etc. The other nutrient, Vitamin D3, is required for bone mineralization and provides a wide variety of health benefits.

Irrespective of age, vague complaints of generalized weakness and pain of lower limb while walking was common in urban populations since they spend a long hour in air-conditioned. It has been found that vegetarianism is an important risk factor for B12 deficiency [13]. In our study also, deficient Vitamin B12 level was found in 91 participants of which 83% were vegetarians. Similar to our finding, a study conducted by Sivaprasad e*t al.* [14] on South Indian population showed that B12 deficiency was higher in vegetarians (54%) compared to those

consuming mixed diet (31%). Another study carried out by Yajnik *et al.* [15] where they included 441 middle-aged men living in rural and urban India, showed that 81% of the urban middle-class men had low Vitamin B12 concentration and vegetarians were particularly higher risk of the deficient B12 level.

Our study also shows a significant association between smoking status and low Vitamin D/B12 level. Similar to our finding, Hakooz *et al.* [16] found that plasma B12 level was significantly lower in smokers compared with non-smokers in two ethnic groups: Circassians and Arabs ($p<0.005$).

Few Indian studies have been conducted till date assessed both micronutrient status (Vitamin D and B12) simultaneously, in patients who suffered the pain of lower limb and had lethargies. A cross-sectional and interventional study carried out by Chaitanya *et al.* [17] on company executives of India, reported 65% executives had Vitamin B12 deficiency (<193 pg/ml) and 28% executives with Vitamin D deficiency (<7.6 ng/ml). Significant improvement in serum B12 and Vitamin D3 levels have been shown in this study after oral supplementation of B12/D3.

Despite living in a sunshine country Vitamin D deficiency has been reported among urban population [18,19]. Modernization, sedentary way of working, less exposure to sunlight, vegan/vegetarian diet, stress, pollution, poor diet may be the possible cause for both Vitamin D and B12 deficiencies.

Our study has the following limitations. First, we obtained less sample size in adolescent and elderly groups. Second, we did not analyze other biochemical marker such as homocysteine that might be associated with the difference in Vitamin B12 level. Also, time spent in sunlight and seasonal variations has not been accounted in the study for which Vitamin D status might be affected.

CONCLUSION

The findings of this study report a high prevalence of Vitamin D/B12 deficiencies among urban populations complaining pain of lower limb and have generalized weakness. These patients should be repeatedly tested for Vitamin D/B12 deficiency. A vegetarian diet, cigarette smoking seems a strong risk factor for Vitamin D/B12 deficiencies. Our study emphasizes the need of regular monitoring of these two micronutrient statuses in these patients so that appropriate intervention programs can be implemented to address this problem.

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