Incidence of vitamin B12 / D3 deficiency among company executives

Abstract
The present cross-sectional and interventional study was carried out to assess the incidence of vitamin B12 / vitamin D deficiency in male office executives in the tropical city of Mumbai, India. A total of 75 senior executives were surveyed and subjected to analysis of blood levels of vitamin D (25 Hydroxy Cholecalciferol) by RIA method and vitamin B12 by CLIA method. The same was performed in a reputed analytical laboratory with NABL accreditation. History of smoking, exposure to sunlight, exercise, dietary habits, consumption of vitamin supplements, medication etc. was obtained.

The results revealed 65% executives with vitamin B12 deficiency (less than 193 pg/ml) and 28% executives with vitamin D deficiency (less than 7.6 ng/ml). The prevalence of low levels of vitamin B12 is lower (58%) in those who give history of regular exercise than others. The prevalence of vitamin D deficiency is lower (25%) in those who give history of regular exercise than in others (46.2%). Prevalence of vitamin D deficiency is higher (47%) in those whose workday started earlier than those whose workday started later (12%).

In the second phase of the survey, 58 executives with low B12/ D3 values, were given vitamin B12/D3 oral supplements for a period of three months along with counseling for lifestyle modification. A modified questionnaire was then circulated and the subjects analyzed for B12/D3 values. Significant improvements in serum B12 and D3 values were seen after the oral therapy, sun exposure and dietary modifications.

Key words: Alfacalcidol, mecobalamine

INTRODUCTION

Vague complaints of unexplained pain in upper and lower limbs were encountered among senior executives in our company, who worked long hours in air-conditioned offices and in spite of living in a city with a tropical climate, were barely exposed to sunlight.[1]

The aim of the survey was to assess the incidence of vitamin B12 and D3 deficiency among these executives.

The second part of the survey aimed to observe the effectiveness of oral supplements of B12/D3.[2]

The human daily requirement of Vitamin B12 is about 5 mcg

Adequate amounts of vitamin D3 can be obtained by sun exposure of as little as exposure of face and hands to ambient sunlight for twenty minutes thrice a week.

MATERIALS AND METHODS

First phase questionnaire (included the following)

- 86 male senior executives- response rate-89%.
- Age: 40 to 68 years.
- H/o mode of travel to office, sun film on car windowpanes, duration of hours spent in office.
- Variables: Physical exercises - indoor or outdoor, smoking, alcohol consumption, history of abdominal surgery, medications esp H2 receptor blockers and PPI's
- Informed consent obtained.
- Blood samples collected at the worksite itself.
- D3 - Analyzed by radioimmunoassay (RIA- BioSource Europe SA, Belgium)
- B12 - Analyzed by chemiluminiscent enzyme immunoassay (CLIA) (Immulite 2000 - solid phase, competitive CLIA).

Second phase

- Treatment for three months: Tab Mecobalamine 1 OD / Tab Alfacalcidol 25 mg 1 OD.
- Dietary modification advised.
- Increased sun exposure.
- Modified questionnaire: 58 subjects with low values of vit B12 and/or D3,
- Blood samples were analyzed for B12/D3 levels.
RESULTS

First phase of survey

- All subjects traveled to office in cars with sun film on windowpanes and spent 9-10 hours at work, indoors in an office building, which has sunscreens on window panels.
- 65% of executives had vitamin B12 deficiency (< 193 pg/ml) and 29% were in the range of 194 to 500 pg/ml [Figure 1].
- 28% of the subjects had vitamin D deficiency (< 7.6 ng/ml) and 55% were in the range of 7.6 to 30 ng/ml.
- Deficient vitamin B12 values were found in 49 subjects of which 70% were vegetarians and 30% non vegetarians, (who consumed non veg food occasionally) [Figure 2].
- Prevalence of vitamin D deficiency is higher in those whose workday started earlier (47%) than in those whose day started later (12%) [Figure 3].
- Of the subjects who consumed alcohol, 55.81% were found to be deficient in vitamin B12. Alcohol is known to retard the absorption of vitamin B12.
- Of those who did no physical exercises, 58.4% were grossly deficient in vitamin D whereas 41.6% had values between 7.6 to 20 ng. All of them were deficient in vitamin B12.
- Of the vitamin D deficient subjects, 32% did not exercise at all, 47% did Indoor exercises thus hardly exposing themselves to sunlight [Figure 4].
- Of the subjects who had complained of pain in limbs, 52% were found to B12 deficient. 20% subjects were deficient in vitamin D whilst 28% had low values of < 20 ng/ml.
- Of the total sample size of 84, there were 17 smokers, of which 13 were deficient in vitamin B12.
- There was no subject with any kind of abdominal surgery. Of the group there were 10 suffering from hypertension and 8 from diabetes.

Second phase of survey

- 47 subjects took oral B12 supplements and all showed improvement in their serum B12 values [Table 1]. Of the 30% who remained deficient, 17% had not taken the full-prescribed treatment.
- 45 subjects took oral D3 supplements and all showed improvement in their serum vitamin D3 values [Table 2].
- 36 subjects increased their duration of sun exposure and 86% showed improvement in serum vitamin D3 values. 38% increased from deficient to normal whilst 47% showed improvement from their lower normal values. 13% subjects showed reduction in their D3 values but of these 11% subjects had not taken oral Supplements of D3.
- 11 vitamin B12 deficient subjects reduced their consumption of alcohol and of these 81% subjects have shown improvement in their serum B12 values with oral supplements of B12.
- Of the 14 subjects who had reported complaints of pain in the limbs and who had taken vitamin B12/D3 supplements, 78% subjects reported improvement in their symptoms.

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**Figure 1:** Prevalence rates of vit B12 /D3 deficiencies

**Figure 2:** Relationship of diet with vit B12 deficiency

**Figure 3:** Relationship of work schedule with vitamin D3 deficiency

**Figure 4:** Relationship of exercise with vitamin D deficiency
**Statistical analysis**

- In spite of living in tropical climates with abundant sunlight, vitamin D3 deficiency is evident in the urban Indian population as a corporate lifestyle disorder. Office executives especially, are not exposed to sunlight due to changing lifestyles, long working hours and the modern environment.[3]
- Incidence of vitamin B12 deficiency is observed to be high, probably due to predominantly vegetarian diets and insufficient consumption of dairy products, poultry and meat.
- Effectiveness of oral supplementation of B12/D3 is demonstrated by the results of the second phase of the survey.[4] Increase in sun exposure, dietary modification and reduction in alcohol consumption were also effective. Office executives need to exercise outdoors and thus increase their exposure to sunlight to facilitate vitamin D absorption.
- Serum vitamin B12/ D3 analysis is being made part of the annual check up for all Reliance employees.

**ACKNOWLEDGEMENT**

Reliance Industries Ltd., Hemang Gor and Kadar Shaikh.

**REFERENCES**


**Source of Support:** Nil, **Conflict of Interest:** None declared.