Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Orthopaedics

A Study for Assesment of Role of Vitamin D3 and Vitamin B12 in Musculoskeletal Pain Relief

Dr. Neetin Prahlad Mahajan[1], Dr. Jayesh Anant Mhatre[2], Dr. Tushar Patil[3*], Dr. Parikshit Chakole[4]

[1]Head Of Unit, [2,3,4]Junior Resident, Dept. of Orthopaedics, Grant Government College Mumbai, India

DOI: 10.36347/sjams.2022.v10i04.035 | **Received:** 18.02.2022 | **Accepted:** 21.03.2022 | **Published:** 30.04.2022

***Corresponding author:** Dr. Tushar Patil
Junior Resident, Dept. of Orthopaedics, Grant Government College Mumbai, India

Abstract **Original Research Article**

Introduction: Chronic nonspecific musculoskeletal pains a pain persisting more than its expected tissue healing time and is commonly seen in patients attending orthopaedic clinics. ***Materials and method:*** We did a prospective observational study including the patients who attended our outpatient department in a tertiary care hospital with sample size n= 200 from period January 2019 to December 2020(two years), with follow up on 2 weeks, 6 weeks and 4 month and 6-month interval. We assessed the onset of pain, involvement of the region (localised or generalised) likely pain over nape of neck, shoulder pain, low back ache, vague pain with generalised weakness. On follow up we assessed the pain over visual analog pain scale and generalised wellbeing of the patients. ***Result:*** Our study was conducted in a tertiary care hospital, so the large number of patients were presented to us with complaints of pain after applying inclusion and exclusion criteria we were able to include 200 patients in our study out of which 20 years was youngest and 72 years was the oldest patient , with median range of 44.21 years , we tried to maintain an equal male to female population with 52.5% female patients for data comparison and removal of gender as confounding factor or 105 patients. ***Conclusion:*** Musculoskeletal pain is a chronic idiopathic condition which is difficult to diagnose and treat. Both vitamin D3 and B12 supplements have shown to provide significant pain relief in this condition.

Keyword: Chronic, Musculoskeletal, pain, vitamin d3, vitamin b12.

INTRODUCTION

Chronic nonspecific musculoskeletal pains a pain persisting more than its expected tissue healing time and is commonly seen in patients attending orthopaedic clinics. It is associated with decreased mental, physical, and social health and decreased working capacity [1].

The aetiology is idiopathic with prevalence for low back ache between 8-44% while prevalence for widespread pain to be between 1-15% [2].

Both vitamin D3 and vitamin B12 have been suggested in various studies to be used for musculoskeletal pain relief. Vitamin D is an important biological regulatory nutrient which is involved in calcium haemostasis but also plays an important role in having anti apoptotic, anti-inflammatory, and anti-fibrotic properties [1, 2].

Vitamin B12 has central and peripheral cyclooxygenase enzymes inhibiting properties. It also decreases pain signalling by regulating capsaicin receptors [3].

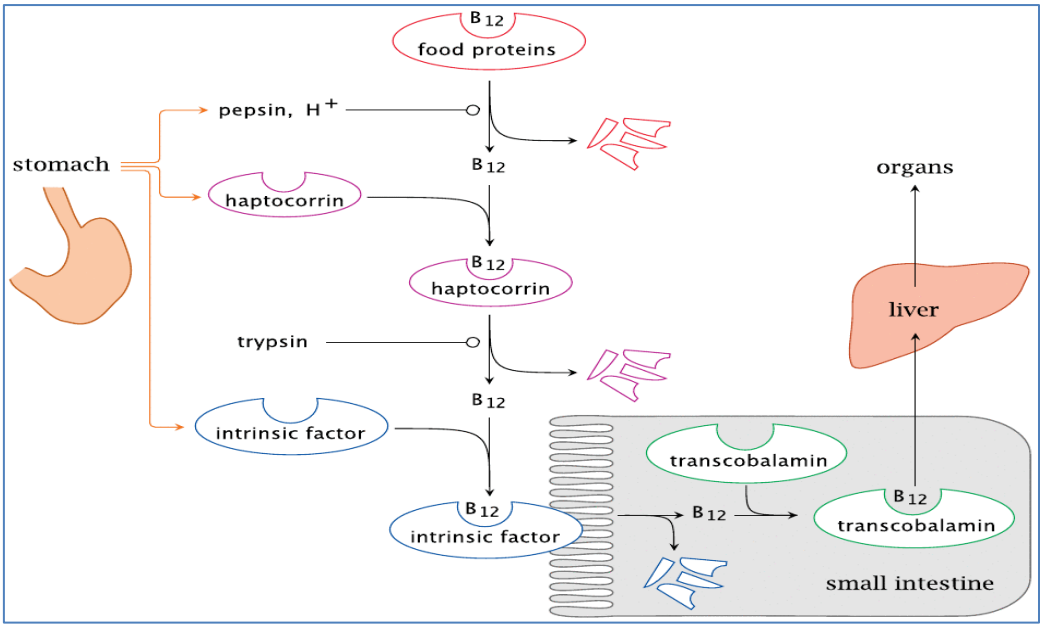

Fig-1: Metabolism of Vitamin-B12

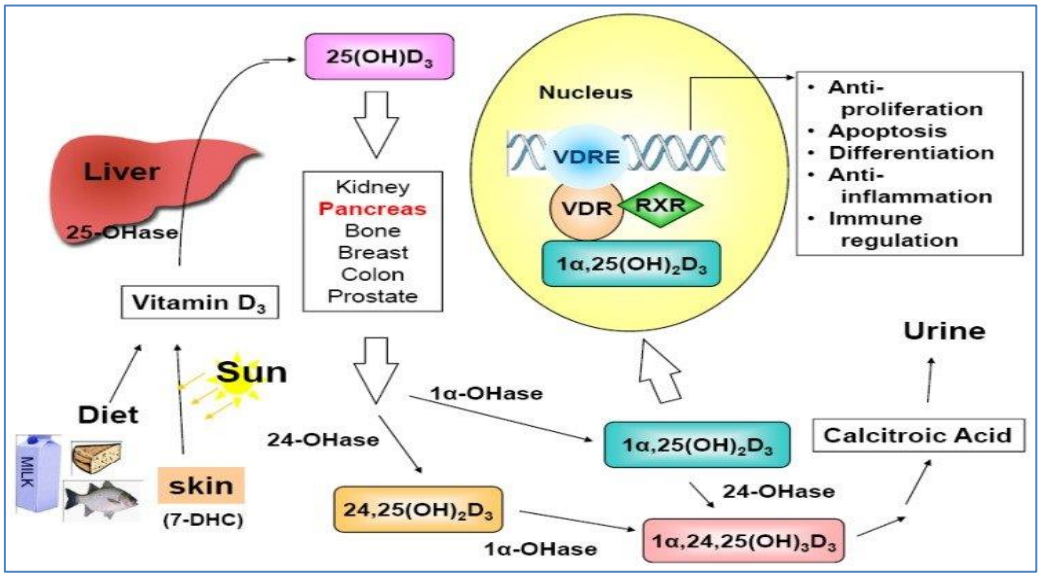

Fig-2: Metabolism of Vitamin D3

MATERIALS AND METHODS

We did a prospective observational study including the patients who attended our outpatient department in a tertiary care hospital with sample size n= 200 from period January 2019 to December 2020(two years), with follow up on 2 weeks, 6 weeks and 4 month and 6-month interval. We assessed the onset of pain, involvement of the region (localised or generalised) likely pain over nape of neck, shoulder pain, low back ache, vague pain with generalised weakness. On follow up we assessed the pain over visual analog pain scale and generalised wellbeing of the patients.

Inclusion criteria

We included patients from age 18 to 75 years, all the patients included had complaints of vague body ache, low back ache, multiple joint ache (small and big joints included), patients with exclusive veg diet and mixed diet were included, all the patients were explained about study procedure and those willing to give consent were included.

Exclusion criteria

patient who were underage, patients with recent history of pain due to trauma, fracture, any long-standing arthritis, severe joint destruction, chronic inflammatory or autoimmune disease, chronic kidney disease, metastasis history or any infective disease and those not willing for consent were excluded from study.

RESULTS

Our study was conducted in a tertiary care hospital, so the large number of patients were presented

to us with complaints of pain after applying inclusion and exclusion criteria we were able to include 200 patients in our study out of which 20 years was youngest and 72 years was the oldest patient, with median range of 44.21 years , we tried to maintain an equal male to female population with 52.5% female patients for data comparison and removal of gender as confounding factor or 105 patients and we had 128 patients with known co-morbidities which were under treatment, we had 48 patients with type 2 diabetes mellitus, 34 patients with only hypertension and 18 patients with both of the above, out of the total population which was included 88 patients were of Pure-vegetarian diet and 112 were of mixed diet, out of the vegetarian population n=88 we had 48 females and 40 males, out of total n=119 patients had a sedentary lifestyle with very low exposure to sunlight and improper food habits.

Site of pain	Female	Male	Total
Cervical or neck pain	20	14	34
Low back ache	15	14	29
Low back ache with radiation to both lower limbs	18	10	28
Bilateral shoulder pain	20	10	30
Bilateral thigh pain	11	9	20
Uni or bilateral knee pain	6	11	17
Upper back ache	5	9	14
Calf pain or pain over soles of feet	10	18	28

On presentation, we did biochemistry workup at day one for all patients measuring, vitamin d3, vitamin b12, serum uric acid, ESR, C-reactive protein, hemogram, we also did radiographs to rule out osteoarthritis and other inflammatory conditions.

We observed the values of serum vitamin d3 and serum vitamin b12 and graded them into very severe deficiency, severe deficiency, deficiency and adequate groups, we gave appropriate dosage to the deficient subjects with prescription of over the counter drugs, we gave oral dose of vitamin d3 60000 IU weekly for 8 weeks in vitamin d deficient group and oral vitamin B 12 1500 mcg over 15 days, we also advised change in sedentary lifestyle and improvement in diet patterns, we followed up the levels of vitamins amongst the subjects over 6 months and also monitored their symptoms and generalised well being.

Categorisation	Level of serum Vitamin B12	Level of serun viatmin D	No. of patients	Management
Very severe deficiency	<100 pg/ml	<5 ng/ml	82	Injectable vitamin d and injectable vitamin b12
Severe deficiency	100-150 pg/ml	6-10 ng/ml	58	Oral vitamin d and vitamin b12
Defciceny	150-200 pg/ml	10-20 ng/ml	48	Oral vitamin d and vitamin b 12

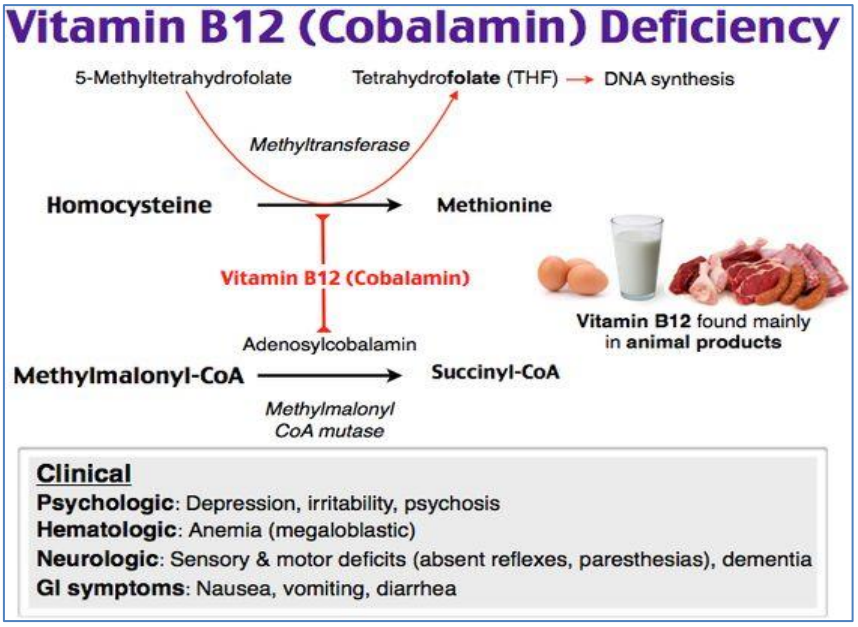

Fig-3: Pictorial representation of vitamin B12 deficiency

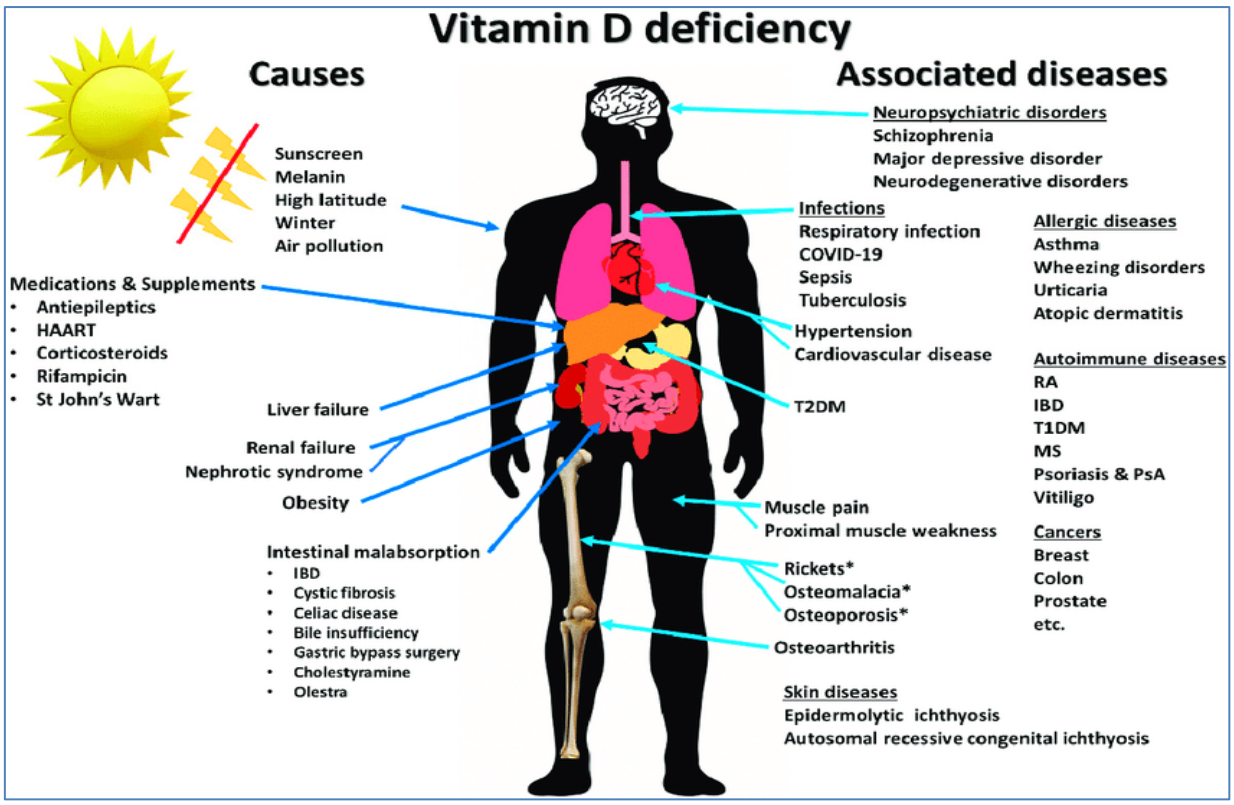

Fig-4: Pictorial representation of Vitamin D deficiency

DISCUSSION

Normal levels of vitamin D3 are 30-50 ng/ml and normal levels of vitamin B12 are 180-900 pg/ml. Vitamin D3 (cholecalciferol) is a fat-soluble steroid hormone. In skin 7 dehydrocholesterol is converted to 25 hydroxy vitamin d under exposure of sunlight specifically 290-320nm of ultraviolet rays which us then metabolized to active 1 25 dihydroxy vitamin d3 in kidneys[4].

25 hydroxy vitamin d levels are accepted as best measure of vitamin d status during past 3-4 weeks [5]. Vitamin D deficiency is quite common in general population with a prevalence of 25-50% [6].

Vitamin D deficiency leads to decreased bone mineralization which causes increased chances of fractures and falls, rickets in children, osteomalacia in adults, osteopenia, and osteoporosis [6].

It has been associated with musculoskeletal disturbances, infections, autoimmune disorders, respiratory diseases, neuromuscular functions, metabolic syndromes, diabetes, cardiovascular diseases, cognitive function disorders, increased risk of cancers and psychiatric disorders [6].

Vitamin d is involved in regulation of muscle protein and its deficiency can cause muscle weakness and pain in children and adults leading to impairment of neuromuscular coordination. It is involved primarily with faster and stronger type 2 muscle fibres [4].

Musculoskeletal pain may be caused due to osteomalacia by spongy matrix formation under periosteal membranes caused by demineralization of bones caused by vitamin d deficiency [5].

Vitamin B12 (cyanocobalamin) is the most complex and largest vitamin in human body. Its structure consists of a corin ring, and its active site utilizes cobalt [5, 6]. It is normally acquired orally through food and absorbed in small intestine with the help of intrinsic factor [6, 7].

Vitamin B12 has an affinity for neural tissues. It induces axonal growth and Schwann cell differentiation which improves functional recovery in nerve injuries [7].

Vitamin B12 is found to have synergistic effect when combined with opioids for pain relief due to cyclooxygenase inhibiting action [7, 8].

In our study n=168 patients had vitamin d deficiency, with very severe among 80 and severe among 50 and 38 patient were deficient, and similarly n= 144 had vitamin b-12 deficiency with 66 very severe cases and severe deficiency in 54 and deficiency in 34 patients, combined deficiency was seen among 139 patients , among the population on pure vegetarian diet n=88, all patients had combined deficiency and among

those the number of very severe deficiency patients was high, our study indicate the role of diet very high in the deficiency of these essential nutrients, many studies indicate regular supplementation of such vitamins among that population[8].

Studies have also shown oral vitamin b12 to have a synergistic effect with diclofenac combination for relief in low back aches and musculoskeletal pains in fracture patients. This synergistic effect has helped to decrease the dose of diclofenac, decreasing the incidence of gastrointestinal discomfort caused by nsaids (non-steroidal anti-inflammatory drug) [8].

There is evidence of increased efficacy in pain relief with combination of b complex vitamins with nsaids in treatment of musculoskeletal pains with decreased dosage and complications of nsaids [8, 9].

Studies by Mauro and Chiu *et al*. stated that daily injections of 1000 microgram of cyanocobalamin resulted in 80% pain reduction whereas thrice weekly injections of 500 micrograms resulted in 30% pain reduction in cases of low back ache [9].

In our study, after administration and supplementation of these essential nutrients we were able to achieve very favourable result in reduction of pain symptoms and increasing generalised well being of the subjects.

CONCLUSION

Musculoskeletal pain is a chronic idiopathic condition which is difficult to diagnose and treat. Both vitamin D3 and B12 supplements have shown to provide significant pain relief in this condition. Vitamin D3 acts by regulating calcium levels and muscle proteins with suppression of central and peripheral cytokine pathways whereas vitamin B12 acts by inhibiting central and peripheral cyclooxygenase pathways.

REFERENCES

1. Gaikwad, M., Vanlint, S., Mittinity, M., Moseley, G. L., & Stocks, N. (2017). Does vitamin D supplementation alleviate chronic nonspecific musculoskeletal pain? A systematic review and meta-analysis. *Clinical rheumatology*, *36*(5), 1201-1208.
2. McBeth, J., & Jones, K. (2007). Epidemiology of chronic musculoskeletal pain. *Best practice & research Clinical rheumatology*, *21*(3), 403-425.
3. Buesing, S., Costa, M., Schilling, J. M., & Moeller-Bertram, T. (2019). Vitamin B12 as a Treatment for Pain. *Pain physician*, *22*(1), E45-E52.
4. Shipton, E. A., & Shipton, E. E. (2015). Vitamin D and pain: vitamin D and its role in the aetiology and maintenance of chronic pain states and associated comorbidities. *Pain research and treatment*.
5. Atherton, K., Berry, D. J., Parsons, T., Macfarlane, G. J., Power, C., & Hyppönen, E. (2009). Vitamin D and chronic widespread pain in a white middle-aged British population: evidence from a cross-sectional population survey. *Annals of the rheumatic diseases*, *68*(6), 817-822.
6. Yilmaz, R., Salli, A., Cingoz, H. T., Kucuksen, S., & Ugurlu, H. (2016). Efficacy of vitamin D replacement therapy on patients with chronic nonspecific widespread musculoskeletal pain with vitamin D deficiency. *International journal of rheumatic diseases*, *19*(12), 1255-1262.
7. Garza, A. F., Monroy-Maya, R., Soto-Ríos, M., Reyes-García, G., Carrillo-Alarcón, L., Ponce-Monter, H., & Ortiz, M. I. (2008, December). A pilot study of the effect of diclofenac with B vitamins for the treatment of acute pain following lower-limb fracture and surgery. In *Proc West Pharmacol Soc* (Vol. 51, pp. 70-72).
8. Mibielli, M. A., Geller, M., Cohen, J. C., Goldberg, S. G., Cohen, M. T., Nunes, C. P., ... & Da Fonseca, A. S. (2009). Diclofenac plus B vitamins versus diclofenac monotherapy in lumbago: the DOLOR study. *Current medical research and opinion*, *25*(11), 2589-2599.