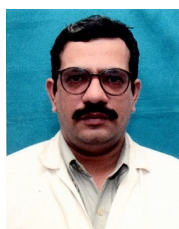


**CASE STUDY REPORT ON EFFICACY OF VITAMIN D IN PHYSIOTHERAPY*****¹DR. S.S. SUBRAMANIAN, Ph.D, ²MS. S. SUGANTHI AND ²MR. N. MOHAMMED SHABEER**¹ Principal, Sree Balaji College of Physiotherapy, Bharath University, Chennai-100² IIIrd Year B.P.T, Sree Balaji College of Physiotherapy, Bharath University, Chennai-100**ABSTRACT**

It is well known that minerals and vitamins are most important for musculoskeletal function. Our objective was to analyse the efficacy of Vitamin D in physiotherapy and to evaluate clinical implications of Vitamin D with pain and exercises. 40 year male with pain and stiffness in cervical region was treated with exercises, with an increased fatigue, repeated stiffness, recurrence of pain, we have referred the subject for Vitamin D evaluation and treatment to physician. As Vitamin D was only 10 ng /ml, the subject with due medicine, followed by exercises has shown clinical improvement. Thus clinical manifestations of physical sign are of most importance with physiotherapy is evident.

KEYWORDS: Neck Disability Index, Osteomalacia, Fibromyalgia, Arthralgia, Homeostasis**DR. S. S. SUBRAMANIAN***

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INTRODUCTION

Vitamin – D also known as cholecalciferol or calcidial is a fat soluble vitamin obtained from sunlight exposure, food and supplements¹, either ingested or manufactured in the skin in response to sun exposure, must first be converted to the prohormone 25 (OH) D in the liver and in the kidney and then to the active hormone 1, 25 (Oh) 2D by tissues containing 1- α – hydroxylase enzyme. The active form of vitamin – D (OH) 2 D – may function in an endocrine fashion, where vitamin D plays an important role in homeostasis². Humans get vitamin D from exposure to sunlight, diet and dietary supplement³. Exposure spots are face, arms, legs and back for 5-30 minutes, between 10 A.M – 3 P.M⁴. Vitamin D important in a number of physiologic processes, including calcium absorption, innate and adaptive immunity and homeostasis of a number of organs⁵. Vitamin D deficiency in adults results in osteoporosis, osteomalacia, muscle weakness and increased risk of falls⁶. Vitamin D deficiency refers to a level of 20ng/ ml and expected normal level is 30 ng/ ml and above highly insufficient being below 10ng/ ml⁷. 1 billion people worldwide have vitamin D deficiency studies conducted in Saudi Arabia, VAE, Australia, India, Turkey⁸. Prevalence of vitamin D deficiency: Prevalence of Vitamin D deficiency in US adults is 25% for men and 35% for women⁹. 50% post menopausal women with osteoporosis are especially likely to exhibit deficiency¹⁰. 30-50% of children and adults have shown Vitamin D deficiency¹¹. Symptoms of Vitamin D deficiency can be non specific and include fatigue, altered mood, depression, non radicular back pain, arthralgias (of wrist, ankle, shoulder) proximal muscle weakness and headache¹². Low Vitamin D is associated with several auto immune disorders such as rheumatoid arthritis, type I diabetes, obesity, systemic lupus erythematosus, increased hypertension, myocardial infarction, breast and colon cancers¹³. Vitamin D deficiency in intestinal calcium absorption¹⁴ and an increased parathyroid hormone¹⁵. Which activates osteoblasts, which stimulate the transformational preosteoblasts into mature osteoblasts¹⁶. Further dissolves the mineralized collagen matrix in bone, causing osteopenia and osteoporosis¹⁷.

AIMS & OBJECTIVES

1. This original case study analyses among clinical physiotherapist, who evaluates and directly involved in treating the patients should have a thorough knowledge of various vitamins and minerals influencing underlying clinical conditions, laboratory values.
2. With an objective to develop the skill of referring to concerned physician for medical management,

promote ethical and enhance higher standard of one self and follow professional practice with due evidence.

PAST MEDICAL HISTORY

40 year old male subject with C/O Neck stiffness and pain was treated elsewhere with infrequent physiotherapy with cervical traction, interferential therapy and non steroidal anti inflammatory drug for more than six months. Vegetarian, occasional alcoholic with sedentary life style. BMI- 32 Kg/m²

ON EXAMINATION

- Obliterated Cervical Lordosis, No Tenderness over cervical spine. Range of Bilateral Shoulder restricted, beyond 90⁰ in all directions.
- He was ambulant with no radicular symptoms
- Cervical-Spine movements are restricted at end range with anteverted Scapulae.

INVESTIGATION

- X-ray of cervical spine AP and lateral views taken by an orthopaedic surgeon revealed early degenerative changes of cervical spine C4, C5.

PROVISIONAL DIAGNOSIS

Cervical degenerative lesion C4 & C5

He was treated with Physiotherapy as below

- Hot pack application for 10 minutes.
- Shoulder bracing, Isometric neck exercises and myotome based exercises using irradiation of PNF technique in 4 sessions with 8 exercises of three repetition on alternate days.
- Patient has recovered and was advised to continue home exercises and report for review after a week.
- Salient points clinically noted during exercise session includes
- profuse sweating, mild palpitation and fatigue with mild exertion.
- In a week's time subject has again attended the department with C/O pain and stiffness of neck along with diffuse spinal pain and sacroiliac joint tenderness, then he was referred to the orthopaedician.
- Which revealed on laboratory investigations with a low Vitamin D, of 10ng/ml.
- Subsequently with due medical management, physiotherapy was started after a week's time, with the results as shown below:

Table 1

RESULTS OF PRE EXERCISES ALONE AND EXERCISES AFTER VITAMIN D ON NECK DISABILITY INDEX.

NDI with Exercises Alone	NDI With Exercise Results after vitamin D Supplement
68%	14% Decreased by 79%

DISCUSSION

As skeletal muscles have a vitamin D receptor and may require vitamin D for maximum function⁸. Vitamin D deficiency causes muscle weakness⁷. Generalized bone pain as in osteomalacia is associated with vitamin D deficiency¹⁸. Similar study findings in USA where 90% of persons from 10-65 years of age admitted at a hospital emergency with muscle aches and bone pain, had variety of diagnoses including Fibromyalgia, Chronic fatigue syndrome, Depression, were deficient in vitamin D¹⁹. This case study subject treated with exercises after vitamin D supplement has a reduced neck disability index by 5 fold decrease is prudent, as displayed in the above graph 1. Hence clinical application of learned knowledge is vital for physiotherapist is more evidenced. Having hypovitaminosis D this subject may be associated with risk of susceptible low bone mineral density²⁰ and with sedentary life style with limited solar exposure could influence low level of Vitamin D²¹ of this patient possible mechanism of how vitamin D deficiency in this subject could cause pain, muscle weakness and its influence on musculoskeletal disorders as below with due evidence: study by²², have supported to measure vitamin D among subjects with chronic pain, as similar to this subject also had chronic pain, hence evaluation of vitamin D was done. In line with RCT by²³, where patients with diffuse musculoskeletal pain with vitamin D values lower than 20 ng/ml when treated with vitamin D supplement have shown significant improvement, this subject with low vitamin D at 10 ng/ml when treated with exercises followed by vitamin D supplement has shown an improved functional activities as shown in the table 1. As vitamin D exerts a direct action on skeletal muscle function²⁴. With uptake of inorganic phosphate, which is important for the production of ATP and creative phosphate, Vital for muscle contraction²⁵ as evidenced by this, this case study subject having a vitamin D deficiency of 10 ng/ml with muscle weakness and pain. Also following vitamin D supplement, an improved physical performance, decreased pain and improved muscle power along with exercises as recorded by 5 fold decrease in the neck disability index in this study subject was supported by²⁶.

Uniqueness of this study findings

With vitamin D supplement a steady state level is reached by about 3 months. Vitamin D deficiency causes muscle weakness impaired muscle function which are however reversible following vitamin D supplementation²⁶. When patients complaints includes non specific musculoskeletal pain, proximal muscle weakness head ache, insomnia could be associated with vitamin D deficiency², similar to this subject study had reported with non specific neck pain, fatigue, arthralgia, non radicular but recurrence of same complaints physician for further evaluation and medical management which later revealed not only vitamin D deficiency but the subject has early signs of ankylosing spondylitis. A chronic progressive inflammatory disorder with pain and disability decreased quality of life. Hence with clinical signs indicative of underlying coexisting medical condition with timely reference to concerned medical specialist have ensured an early medical management with physiotherapy, was

ensured, the major outcome of this case study presentation. Hence an early identification with clinical means such as unexplained muscle weakness, non yielding pain, a meta analysis of seven RCT that evaluated the risk of fracture in older persons given 400 IU of vitamin 3 per day revealed benefit of reduced risk of hip or vertebral fracture¹³

Future scope of this study findings

Mainly prompt clinical evaluation, analysis and with due evidence early reference to other medical fraternity be practiced by physiotherapists and not only to do exercises shall improve the quality of health care self and the profession Such as a) the influence of vitamins, minerals on the performance of physical activities. b) Clinical signs like non specific pain, muscular weakness, fatigue, non radicular neck or back pain should be clinically evaluated and analyzed with laboratory investigations for various causes including anaemia, diabetes mellitus, auto immune disorders, fibromyalgia, multiple sclerosis, deficiency of vitamin D, B 12 and serum calcium. However larger sample size and longer duration study of this case study could further validate findings of this study more scientifically. European elderly men and women still living in community are 40-10% deficient in vitamin D⁹ 48% of white preadolescent girls in maine were recorded to have a high vitamin D levels below 20ng/ml²⁷. An UK based study have reported that women who were most consistent in taking calcium and vitamin D had a 29% reduction in hip fracture²⁸. In canada to prevent vitamin D deficiency, a recommended guidelines to all infants and children to receive 400 IU of vitamin D 3 per day²⁹

Critical appraisal of this case report

Undiagnosed vitamin D is common⁷ and 25 hydroxy vitamin D is the barometer for vitamin D status, which is not only a predictor of bone health¹³ but is also an independent predictor of risk for cancer³⁰ chronic diseases such as cardiovascular disease³¹, multiple sclerosis³², Rheumatoid arthritis, diabetes mellitus³³. Low vitamin D deficiency is associated with congestive heart failure³¹ and increased incidence of schizophrenia and increased depression, with physiotherapy intervention should immediately be referred to physician for due medical intervention, as to facilitate treatment of underlying medical conditions in the beginning for early recovery of the patient. This practice is more relevant as patients reporting directly to physiotherapists for pain management is the current clinical scenario, hence with a wide clinical knowledge and evidenced physiotherapy practice, any patient similar to this case study with unexplained and non productive therapy should be sought with further medical investigations, due supplement and drug therapy. Even a false referral could be accepted than non referral as patients care to be put forth prior.

CONCLUSION

In an independent practice of physiotherapy, we frequently treat fibromyalgia, muscle aches, joint pain, muscle weakness, hence asking for nature of

occupation, life style, any chances of exposure to sunlight during the day, physical signs such as lethargy, low level exercise tolerance, pain and stiffness increasing with exercises, fatigue, poor prognosis with physiotherapeutic means should think of various factors including vitamin D. Deficiency it up holds the physiotherapy practice with due

ethics and evidence is the core of this case presentation.

CONFLICT OF INTEREST

Conflict of interest declared none.

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