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Vitamin D status in patients with knee and hip osteoarthritis

Orthopaedics

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ABSTRACT

Background Vitamin D plays an important role in bone mineralisation,remodelling and maintainence and therefore its deficiency may be implicated in the pathogenesis of osteoarthritis(OA).Vitamin D status was evaluated in patients with patients with knee and hip OA scheduled for joint replacement.The impact of anthropometric parameters such as gender,age and BMI on vit D was also examined. **Materials and Methods** We included 164 patients with knee or hip OA scheduled for joint replacement in this study.Serum levels of 25 hydroxyvitamin were measured in routine blood samples taken from the patients at their pre admission visit,a week before the operation,using radioimmunoassay. **Results** The majority of patients were vit D deficient(81.7%);15.2% of them were vid D insufficient.Only 3% of patients were vitamin D sufficient.There was a significantly positive association between Vit D levels and male gender. **Conclusions** These findings indicate a large percentage of vit D deficient patients with knee or hip OA,which is unexpected.Many other possible predisposing factors should be also considered.Whether treatment with Vit D supplements may provide beneficial effects to these patients and stage of disease in which this treatment should commence remains an issue for further scientific investigation.

Introduction

Vitamin D deficiency is one of the most common and under-diagnosed medical conditions in the world,since a significant proportion of the population in many countries and regions around the world have low vitamin D(1-4).The 25-hydroxyvitamin D level depends on various parameters,including the amount of solar ultraviolet B(UVB) irradiation(determined by the time of the day,season(5-7) latitude,skin pigmentation,and use of sunscreen),age(7),dietary habits,gender,obesity(8),and many others(9).

Vit D plays an important role in bone mineralisation,remodelling and maintainence and therefore the deficiency may be implicated in the pathogenesis of osteoarthritis(OA)(10,11).Although the pathogenesis of OA is still unclear,recent evidence suggests that changes in subchondral bone remodelling-phases of bone resorption and of sclerosis-may be responsible for cartilage damage.Vit D has been shown to modulate the activity of metalloproteinase enzymes.Low levels of 25(OH)D3 lead to an increased production of degradative enzymes(12).The theory behind changes in the bones is that low levels of 25-hydroxyvitamin D slow the remodelling response of subarticular bone,resulting in thickening of the subchondral bone,osteophyte formation and resultant cartilage damage(13).

Prospective epidemiological studies have found an association between dietary intake and serum levels of 25(OH)D and the development or progression of radiographic hip(14-15) and OA knee(22).Low serum levels of 25(OH)D have been reported in a significant proportion of patients with OA of hip and knee joints(14,16-24).Some authors suggest that achieving Vit D sufficiency may prevent and/or delay cartilage loss in knee OA(15,25).In patients with hip OA who underwent total hip replacement,25-hydroxyvitamin D levels were found to correlate positively with both pre and post-operative Harris hip score.Therefore,it seems that vit D deficiency in patients undergoing THR may be a risk factor for a suboptimal outcome(19).

However,results of others studies do not support an association between the low levels of serum 25(OH)D and the development of OA(27-29).An association of serum 25(OH)D levels with hip or knee OA has therefore not yet been fully established.The authors recommended serum 25(OH)D measurement in any patient with symptoms suggestive of OA,particularlt at the initial stage of disease(23).

The main purpose of this study was to evaluate the vit D status in patients with knee or hip OA scheduled for joint replacement.Association between Vit D Serum levels and gender,age,BMI were also investigated.

Materials and Methods

This study cohort study was conducted from December 2014-15.The study was approved by the ethical committee of the hospital and study was prepared with patients consent.

Patients with OA hip or knee scheduled for hip and knee replacement were included in thin study.Exclusion criteria were inflammatory arthritis ,malignancy,renal failure,or anemia.

The clinical examination of patients combined with a knee and hip plain radiograph set the diagnosis of OA.The Kellgren and Lawrence scale (26) was used and patients with grade 3 or 4 OA were scheduled for joint replacement.

Blood samples were taken from the patients at their pre-admission visit by a resident orthopaedic surgeon,a week before the operation.The serum levels of 25(OH)D were measured.The patients were categorized into three groups according to their vitamin status.Vit D level <20 ng/ml and Vit D insufficiency as a 25(OH)D level of 21-29 ng/ml(30).

Clinical measurements were recorded by the biochemical laboratory in order to exclude other bone disorder or systemic diseases.

Results

In this study,164 patients were included,42(25.6) of whom were men and 122(74.3%) were women.Age range was 48-86 years.128(78%) patients of suffered from OA knee and 36(22%) had OA Hip.

The levels of Vit D ranged from 1.61 to 52.19 ng/ml(mean=13.4,SD=7.8 ng/ml).It is noteworthy that most of the patients were vitamin D deficient(81.7%).15.2% of patients were vit D insufficient.Only 3% of patients were vitamind D sufficient.Reg BMI,6.1% of patients had optimal weight.36.6% were overweight and more than half of the patients were obese.Additionaly,12 patients,all postmenopausal women,were under medication for osteoporosis with calcium and vitamin D insufficient and only 1 was vit D sufficient.

All analysis were undertaken using the statistical package SPSS for windows version 19.0.

Discussion

The most important finding of this study is the high prevelance(96.9% deficiency and insufficiency) of low serum levels of 25(OH)D in a population with OA.Our study showed that over 4 out of 5 patients with knee or hip OA were vit D deficient with serum levels below 20ng/ml.Several studies have shown a high incidence of vit D deficiency in patients with OA hip or knee(17-19,23,24).Considering the commonness of Sunlight in certain part of the local climate(1-3),we had expected a higher vit D status with Knee or Hip OA.Moreover the prevelance of vit D Deficiency in patients with OA scheduled for total hip or knee replacement in our study was higher than the reported values of studies carried out in the northen Europe such as Finland(17),Germany(18) and the UK(19) where annual isolation is significantly lower.A higher prevelance of severe deficiency of Vit D was also been demonstrated among US women as compared to male(30).In a study that took place in Quebec,Canada,gender was not asasociated with 25(OH)D concentration(31).In addition the same study showed that age and BMI were not correlated with 25(OH)D deficiency.This results corresponds to our finding regarding age and BMI.The notion of association of obesity with low vit D levels is supported by Lagunova et.al(32),who found that the prevelance of vit D def is dependent on BMI and age separately.The results suggested that 1 in 3 women and 1 in 2 men with BMI>40 kg/m2 are vit D deficient.

The limitations of this study include a small sample size,particularly patients with hip OA.Another limitation in the absence of a control group and the scarcity of available data concerning the VitD status in the general population.

Footnotes

There is no financial disclosure.

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