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BENEFICIAL ROLE OF ALPHA TOCOPHEROL (VITAMIN E) IN HUMAN OSTEOARTHRITIS

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ABSTRACT

Single blind six weeks study was conducted in 40 patients between the ages of 4-65 years of either sex suffering from osteoarthritis of at least one knee joint. Alpha tocopherol exhibited better effects by improving symptoms of pain at rest, pain on movements and pain on pressure as assessed by using a four point scoring system. Limitation of movements and walking time were also recorded but did not show any significant improvement.

No adverse effects were noted of vitamin E except in one who complained of insomnia. The beneficial effects of vitamin E can be explained on its well known antioxidant effect, thus stabilizing the lysosomal membrane and inhibiting the release of irritating enzymes cathepsin ribonuclease galactosidases and sulfatases.

INTRODUCTION

Osteoarthritis is probably the oldest disease process in human history. It was present in our primitive ancestors and can be seen on page 6 of Brughsch's Monograph on Rheumatic diseases showing evidence of the disease in bone discovered in Nubin caves dating back to 8000 to 10,000 B.C. The disease does not have a single entity but a heterogeneous group of mechanically determined disorders of joints that have in common remodeling of articular cartilage, subchondrial bone and capsular structure. The underlying pathological events are both productive and degenerative.

Mechanical stress is one of the most important factor. Hence occupation related OA of knee, the large weight bearing joint go in parallel to small interphalangeal joints of cotton weavers (Mankin and Treadwell, 1986). A recent study found no increase in the prevalence of OA among persons occupation involving light labour (Lane NE, 1989).

Radiographic surveys have demonstrated a prevalence of this condition between 40-60 present for the population over 35 years (Peyron and Altman, 1992 and Lawrence et al., 1966).

Women predoinate over men. Ninety percent population by the age of 50 manifest lumbosacral spinal changes on autopsy or radiographic criteria, but only 20% have clinical complaints (Moskowitz, 1984).

Vitamin E was isolated by Evans and coworkers in 1930 from wheat grain oil. 8 naturally occurring tocopherols with vitamin E activity are now known and alpha tocopherol (5, 7, 8 tremethyltocol) is considered to be the most important since it displays the greatest biological activity in most bioassay systems. One of the most important features of tocopherols is that they are antioxidant and this is the bases for most if not all of the effects of vitamin E (Machlin, 1980).

PGE2 (Prostaglandin E2) and IL2 (Interleukin 2) stimulate chondrocytes in vitro and are responsible for promoting bone resorption. An important pathological step in osteoarthritis phenomen. Vitamin E inhibits the formation of PGE2 and so might have role in limiting the process of OA. Both lipoxygenas and cycloxyenose path ways in AA (Arachodonic acid) metabolism involve free radical mediated reactions and so vitamin E might inhibit some reactions leading to the formation of PGS.

Aging is one of the common factors mimicking changes in joints resembling to OA. Many age related alterations in tissues are mimicked in vitamin E deficient animals. Moreover addition of vitamin E in the diet of small animals has increased their life span. We therefore, decided to study the role of Vitamin E in human osteoarthritis.

MATERIALS AND METHODS

Forty patients of either sex suffering from osteoarthritis of at least one knee joint between the ages of 40-65 years were selected from the OPD of Physiotherapy Department of JPMC. Initially the diagnosis was made clinically and then confirmed by radiological and laboratory aids. Patients were excluded from the study who had a recent or concurrent major illness of G.I.T., C.V., C.N. renal, metabolic or haemopiotic systems. Also those suffering from injury or deformity of vertebral column or lower limbs, lactating and pregnant ladies were excluded. The patients were divided at random in 2 groups.

E1 = Receiving vitamin E in 400 mg OD doses.
E2 = Receiving placebo.

Patients were asked to attend the OPD at least twice in a week for followup. For pain 4 point score scale system was used in which grading of the pain from grade 0 to grade III was done depending upon the severity of the symptoms (Goldie, 1981).

Four point scale for pain indicates:

0 = None (no pain felt by the patient).
I = Slight pain which can easily be tolerated.
II = Moderate, that discomforts the patient.
III = Severe pain almost unbearable for the patient.

This grading was converted in numerical by visual analogue scale(VAS) for statistical analysis (Huskinsson EC, 1974).

Limitation of movements were measured by goniometer taking 0-140° as a full range of flexion and extension.

Walking time was recorded through stop watch after asking the patients to walk 40 feet distance in a straight line on plain surface.

Swelling was measured by measuring tape encircling the most prominent portion. Patients were taking different NSAIDS in different doses and were allowed to take the NSAID in the same previous dose but to reduce or stop it in case of better relief.

RESULTS AND DISCUSSION

Beneficial effect of vitamin E in osteoarthritis is explained on bases of various biochemical and biological described among which the antioxidant effect is the main one. Secondary inflammatory process contributes to disease progression both by their degenerative mechanism and also by creating new intra-articular forces (Sokoloff, 1987). Multiple biochemical and biomechanical factors are involved to effect the tissue changes seen in OA. The mechanisms may be modulated by age, sex, hormones, diet, obesity, physical activity, hereditary and metabolic aberations.

As obvious in table 1, the group receiving Vitamin E exhibited significant improvement in parameters of pain at rest and pain on movement. These results also coincide with the results of the study done at institute of Rheumatology Osterreich (Scherak et al., 1990). They tested Vitamin E in 400 mg O.D. in double blind study with 50 mg of diclofenace O.D. for 3 weeks and found results equal or better to diclofenace in reducing pain at rest, pain at pressure and pain on movement. Both were found equally effective in reducing the circumstance of knee joint ($P = 0.001$)

In another study workers were surprised to find that 8 out of 37 patients (22%) reported to be benefited from tocopherol used as a placebo, and they regarded it as a placebo effect (Machtey, 1987).

Nonsteroidal anti-inflammatory drugs is the choice of treatment for the palliation of life long agony of osteoarthritis. None of the NSAIDS is free of toxic effects specially on G.I.T. Moreover many of them are much more costly than vitamin E.

Insomnea complained by one patient in this study appears a psychological effect with no possible explanation to the role of vitamin E.

CONCLUSION

In view of our study results it appears worthwhile that vitamin E in a dose of 400 mg OD can be used safely alone to provide some relief in signs and symptoms of OA at a lower cost. It can also be combined, beneficially, with NSAIDs to reduce their doses, so the toxic effects are minimized. Further studies of this subject seem to be warranted.

Table 1
Therapeutic efficiacy in all parameters after 6 weeks
Values are expressed means ± S.E. units.

Parameters	0 weeks	6 weeks	P value
Pain at rest	2.50 ± 0.51	1.40 ± 0.26	< 0.05
Pain on movement	3.30 ± 0.94	2.10 ± 0.18	< 0.05
Tenderness	3.00 ± 0.94	1.80 ± 0.56	N.S.
Walking time	34.17 ± 10.80	25.75 ± 7.98	N.S.
Number of subjects showing:			
Swelling	6	5	N.S.
Limitation of movements	5	4	N.S.

N.S. = Non significant.

Table 2
Therapeutic efficacy in all parameters
The values are expressed in mean ± S.E. units.

Parameters	0 weeks	6 weeks	P value
Pain at rest	1.30 ± 0.57	0.70 ± 0.51	N.S.
Pain on movement	5.50 ± 0.47	4.10 ± 0.62	N.S.
Tenderness	2.90 ± 0.91	2.20 ± 0.69	N.S.
Walking time	24.85 ± 7.85	23.51 ± 7.43	N.S.
Number of subjects showing:			
Swelling	0	0	N.S.
Limitation of movements	1	1	N.S.

N.S. = Non significant.

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