Indian Journal of Clinical Biochemistry, 2006, 21 (1) 205-207

TUMOR NECROSIS FACTOR ALPHA (TNF-α) AND ESTROGEN HORMONE IN OSTEOARTHRITIC FEMALE PATIENTS

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ABSTRACT

Osteoarthritis of knee joints is a disease of old age in both sex. It is very common after the age of 40 years in elderly females or in postmenopausal phase of females. It is characterized by narrowing of space in joints due to inflammation. The exact mechanism of inflammation in this disease is not yet clear. Tumor necrosis factor alpha (TNF-α) may involve in onset of disease. The present study is being carried out in 130 female subject of age group 40-60 years suffering from osteoarthritis of knee joints and 50 normal healthy control female subjects. A correlation is made between TNF-α and estrogen and found significant inverse correlation (r<0.001), between TNF-α and estrogen hormone in osteoarthritic female patients as compared to normal healthy control female group.

KEY WORD

TNF-α, Estrogen hormone, Osteoarthritis (OA)

INTRODUCTION

Knee joint osteoarthrits is one of the most common musculoskeletal disorder of elderly male and female subject (32). It is characterized by cartilage destruction and narrowing in the joint space due to the inflammation. It has been reported that in females the severity of osteoarthritis could be prevented due to protective role of estrogen up to the time of menopause (1, 2). It also acts as a bone protective hormone in females and this bone protective effect could be mediated by paracrine mechanism involving the non-osteoclastic cell modulation of osteoclast formation and activity (3). Such indirect action appears to decrease the level of cytokines and TNF-α in non-osteoarthritic patients, that promote osteoclastic activity (4). Thus estrogen depletion after menopause or ovariectomy may devate the TNF-α and cytokines. These finding suggest that TNF-α could mediate the loss of bone in estrogen deficiency (5). Therefore the present work is being done to correlate TNF-α and estrogen level in females suffering from knee joint ostearthritis, though a very few references are available to support our study.

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MATERIALS AND METHODS

The study was conducted (with institutional ethical committee approval) in 130 female patients suffering from knee joint osteoarthritis with age group of 40-60 years. They are clinically and radiologically diagnosed osteoarthritis patients, attending OPD of orthopaedic department J. A. Group of Hospital, G. R. Medical College, Gwalior (M.P.) for regular checkup. 50 normal healthy female control subjects of same age group have also been included in our study for statistical comparison. 5 ml of blood was collected from all the subjects in fasting condition and the serum was separated and stored at -20^{0}C until used. The TNF-α and estrogen hormone were estimated by Duoset ELISA technique and EIAGEN estrodial kit respectively in Biochemistry department. All estimations were done in duplicate and the mean values were calculated. The student independent 't' test was used for the statistical analysis of the data. The written consent were also taken from patients prior to study.

RESULT

Table 1 showing the status of TNF-α and estrogen hormone in osteoarthritic female patients and control group. TNF-α was significantly increased (P<0.001), and estrogen hormone was significantly decreased

Table 1. Status of TNF-α and estrogen hormone in female subjects.

Study Groups	Study Parameters	Tumor necrosis factor alpha (TNF-α) (ng/ml)	Estrogen (pg/ml)
Control female Group (n=50)	Min	0.98	10.78
	Max.	1.98	85.94
	Mean ± SD	1.54±0.28	37.03±19.98
	SE	0.04	2.82
Knee joint osteoarthritic female Subjects (n=130)	Min	2.12	9.18
	Max	6.12	78.54
	Mean ± SD	4.23±0.98***	26.98±15.18***
	SE	0.08	1.33

Value expressed as a (P<0.001) *** Highly Significant.

Table 2. Correlation of TNF-α and estrogen hormone in osteoarthritic female subjects

Variables parameters	TNF-α	Estrogen
Estrogen	-0.40***	—
TNF-α	—	-0.40***

Value expressed as a (r<0.001)
*** Highly Significant.

(P<0.001), in female patients with knee joint osteoarthritic as compared with control group. Table 2 showing the inverse correlation of TNF-α and estrogen hormone in osteoarthritic female group (r<0.001).

DISCUSSION

Osteoarthritis (OA) is a complex disease whose pathogenesis includes the contribution of biochemical and metabolic factors altering tissue homeostasis of articular cartilage and subchondral bone (6). During OA degradation of cartilage of knee joints causes inflammation may be due to release of TNF-α & IL-1 which are responsible for proteolytic digestion of cartilage in joints. In our study TNF-α level found to be increased significantly (P<0.001), in female subjects suffering from knee joint OA as compared to healthy control group subjects (Table 1). This is consistent with the studies of Masahiko kobayashi *et al*., Iannone *et al*., Pierre *et al*., Fernandes *et al.* (3, 6, 7, 8). Current researches attribute the change in cartilage to a complex network of biochemical factors including proteolytic enzyme that lead to a breakdown of cartilage molecule. Increased secretion of TNF-α is directly related to activation of osteophytes in synovial fluid of OA patients. TNF-α also stimulates chondrocyte, which are responsible for enhanced activity of proteolytic enzyme i.e. matrix metalloprotease enzyme (MMPs) (3, 8, 9, 10). The cartilage are the prime site of OA disease and is very sensitive to change in sex hormones level. In our study female subjects suffering from knee joint OA of age group 40-60 years (Postmenopausal stage) showed a decreased level of estrogen (P<0.001) as compared to control group females (Table 1). This is in agreement with the studies of Vonmuhlen *et al*., Parazzini *et al*., Janecauley *et al*. (2, 11, 12). The correlative study between TNF-α and estrogen showed an inverse relationship between them (r<0.001) (Table 2). It may be due to estrogen depletion during menopause, which induces TNF-α production from a peripheral blood monocytes and bone marrow cells. Estrogen therapy may help in improvement of MMPs level and may provide some chondroprotective effects (5, 10).

It is concluded from the study that in postmenopausal stage (40-60 years) females the production of TNF-α is due to lack of estrogen. TNF-α could be taken as suggestive marker for assessment of onset of osteoarthritis. The study is still continued for further confirmation of results.

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