ROLE OF TUMOUR NECROSIS FACTOR ALPHA (TNF-α) AND INTERLEUKIN-6 (IL-6) IN POSTMENOPAUSAL OSTEOARTHRITIC FEMALE PATIENTS

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ABSTRACT
INTRODUCTION
Tumour necrosis factor alpha (TNF-α) and interleukin-6 (IL-6) may function to activate enzymes involved in the proteolytic digestion of cartilage in osteoarthritic patients. Osteoarthritis is a very common chronic disease that affects all joint tissues causing progressive irreversible damage and finally, the failure of the joint as an organ.

AIM AND OBJECTIVES
The present work is being done to determine the levels of interleukin-6 and tumour necrosis factor alpha are associated with osteoarthritis in postmenopausal females.

MATERIAL AND METHODS
The present study is being carried out in 150 female subjects of age group of 45-60 years suffering from osteoarthritis and 50 normal healthy control female subjects of same age group. The IL-6 and TNF-α were measured in the serum by enzyme linked immunosorbent assay technique.

RESULTS
In osteoarthritic female patients, TNF-α and IL-6 levels were high as compared to control female subjects (P<0.001).

CONCLUSION
We have observed increased secretion of TNF-α and IL-6 is directly related to activation of osteophytes in synovial fluid of osteoarthritis patients.

KEYWORDS
TNF-α, IL-6 and osteoarthritis.


INTRODUCTION: Osteoarthritis (OA) is one of the most common musculoskeletal disorders of elderly females. OA is considered as the result of mechanical and biological events that induce an imbalance between the degradation and synthesis in articular cartilage in joint tissues. Cytokines and growth factors play an important role in pathophysiology of osteoarthritis.¹,²

They are closely associated with functional alteration in synovium, cartilage and subchondral bone. Cytokines activate the chondrocyte, which in turn produce catabolic factors such as proteases and proinflammatory cytokines.³ TNF-α and IL-6 stimulates proteases and prostaglandin production in female osteoarthritic patients.⁴,⁵ TNF-α and soluble IL-6 receptors in synovial fluids play a role in joint destruction in arthritis by enhancing osteoclastogenesis.⁶ In humans, elevated soluble TNF-α and IL-6 receptors concentration in circulation have been observed after surgical and natural menopausal conditions.⁷,⁸

The present work is being done to determine the levels of interleukin-6 and tumour necrosis factor alpha in postmenopausal osteoarthritic females.

MATERIAL & METHODS: The study was conducted (with Institutional Ethical Committee approval) in 150 female patients suffering from osteoarthritis with age group of 40-60 years. They are clinically & radiologically diagnosed osteoarthritic 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.

5.0 mL of blood was collected from all the subjects in fasting condition and the serum was separated and stored at -20°C until used. TNF-α, IL-6 were estimated by Duoset
ELISA kit, Accucyte ELISA kit and 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 for the data.

Written consent was also taken from patients prior to study.

RESULT: Table-1 showing the status of TNF-α and IL-6 in the osteoarthritic female patients and control groups. TNF-α and IL-6 was significantly increased (p< 0.001), in osteoarthritic female patients as compared with control group.

<table>
<thead>
<tr>
<th>Study Group</th>
<th>Study Parameters</th>
<th>TNF-α (ng/mL)</th>
<th>IL-6 (ng/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Female group (n=50)</td>
<td>Mean±SD SE</td>
<td>1.53±0.28</td>
<td>1.33±0.23</td>
</tr>
<tr>
<td>Osteoarthritis female subjects (n=150)</td>
<td>Mean±SD SE</td>
<td>4.23±0.98 ***</td>
<td>3.84±1.01 ***</td>
</tr>
</tbody>
</table>

Table 1: Status of tumour necrosis factor-α and interleukin-6 in the osteoarthritic female subjects

Value expresses as a (p <0.001).

*** Highly significant.

DISCUSSION: Osteoarthritis is a complex disease whose pathogenesis includes the contribution of biochemical and metabolic factors altering homeostasis of articular cartilage and subchondral bone.9 During degradation of cartilage of knee joints, inflammation may be due to the release of inflammatory cytokines, which are responsible for the proteolytic digestion of cartilage in knee joints.10 In our study, postmenopausal female subjects suffering from knee osteoarthritis showed increased levels of IL-6 and TNF-α (P<0.001) as compared to healthy control-female subjects. This is consistent with the studies of Masaheko et al and Fernandes et al.11,12 Increased secretion of TNF-α and IL-6 directly related to the activation of osteophytes in synovial fluid of osteoarthritic patients. Cytokines stimulate chondrocyte, these chondrocytes are responsible for enhanced activity of proteolytic enzyme i.e. matrix metalloprotease enzyme (MMPs), this is consistent with the study of Sadia et al 2011 and Fernandes et al 2002.13,12 These enzymes are responsible for the degradation of cartilage in OA patients. These menopauses coincide with the appearance of many symptoms, which are associated with osteoarthritis.13,14 The biological significance of serum levels of IL-6 and TNF-α, the mechanism by which its production is regulated in vivo have not been fully elucidated. Though further studies are suggested, TNF-α and IL-6 may be used as a suggestive marker for the assessment of knee osteoarthritis in postmenopausal females.

CONCLUSION: We have observed increased secretion of TNF-α and IL-6 is directly related to activation of osteophytes in synovial fluid of osteoarthritic patients. TNF-α and IL-6 also stimulates chondrocytes, which are responsible for enhanced activity of proteolytic enzyme i.e. matrix metalloprotease enzyme (MMPs). These enzymes are responsible for degradation of cartilage in osteoarthritic patients.

REFERENCES:


