ABSTRACT

KEY WORDS: Osteoarthritis, Osteogenic protein-1, Hyaluronic acid, keratan sulfate.

Background: Osteoarthritis (OA) is a progressive degenerative disorder of the articular cartilage. Regeneration and repair of cartilage have become one of the major problems in the field of current orthopedics. Osteogenic protein-1 (OP-1) has been identified as a bone morphogenetic protein (BMP) with a major role in cartilage repair. Available diagnostic radiography is a poor indicator of progress and severity of clinical disease. Oxidative stress has been implicated as a mediator of cartilage damage in patient with Osteoarthritis (OA).

Methods: This was an experimental and observational study conducted in the department of Biochemistry, SMIMS. Polyclonal antibodies {anti-OP-1(f)} were raised against OP-1 in mice and then it was used in sandwich enzyme linked immunosorbent assay (ELISA) to detect the presence of OP-1 in the synovial fluids of 75 osteoarthritic patients. For the purpose of correlation, radiographic assessment of knee OA was graded according to Kellgren- Lawrence (KL) scoring system. Antioxidants like superoxide dismutase (SOD), glutathione peroxidase (GPx) and uric acid (UA) were assayed in blood and cartilage metabolic markers like hyaluronic acid (HA) and keratan sulfate (KS) were assayed in synovial fluid. Osteogenic protein-1 were correlated with antioxidants, cartilage metabolic markers and age of osteoarthritic patients.

Results and Discussion: The anti-OP-1(f) raised against OP-1 could detect the presence of OP-1 in the synovial fluid of all the osteoarthritic patients by Sandwich ELISA. The level of the OP-1 was found to be much higher than the reference range and correlated positively (r=0.238, p=0.04) with the severity of OA. Osteoarthritic patients showed statistically
significant increase in KS and decrease in HA level indicating cartilage damage. Decrease in SOD and GPx activities indicates increase in oxidative stress. The difference in UA levels in the two groups was not statistically significant. This study did not establish any significant positive/negative correlation between the antioxidants in the blood and cartilage metabolic markers in the synovial fluid of osteoarthritic patients. Age and UA showed a significant correlation with OP–1. On the other hand, the correlations between OP–1 and the antioxidants (SOD and GPx) and the cartilage metabolic markers (HA and KS) were insignificant in osteoarthritic patients. The incidence of patients suffering from knee OA were found to be highest between the age group 69-72 years (32%) followed by the age group between 62-67 years (24%). More females (70%) suffered from knee OA than males (30%). From the ethnic groups, highest number of patients with knee OA were observed in the Bhutias (42.6%).

**Conclusion:** Polyclonal antibody, anti OP-1(f) could be used for immunodiagnosis of osteoarthritis by sandwich ELISA. The decrease in antioxidant enzymes and HA and increase in KS level supports the possible role of oxidative stress in osteoarthritis. The significant correlation between OP-1 and age may suggest age related changes in OP-1 which can be identified as a critical factor in the development of OA. There may be a relationship between OP-1 and UA on development of OA. Age, estrogen and dietary factor may have a role in progression and development of OA.