INTRODUCTION

Osteoarthritis (OA), also known as degenerative joint disorder, is the most common form of arthritis and a leading cause of disability throughout the world (Shakoor and Loeser, 2004). As the number of cases of osteoarthritis keeps on increasing, it has become a serious health and wellness concern worldwide. Osteoarthritis is currently defined by the American College of Rheumatology as a “Heterogeneous group of conditions that leads to joint symptoms and signs which are associated with defective integrity of articular cartilage, in addition to related changes in the underlying bone at the joint margins”. Common synonym used for osteoarthritis is osteoarthrosis, which means that inflammation is mild as compared to other forms of arthritis. Osteoarthritis is characterized by destruction of articular cartilage and formation of a new bone (lipping) at the joint surfaces (Mankin and Brandt, 1989). Any event that changes the environment of the chondrocyte has the potential to cause osteoarthritis (Anderson and Felson, 1988).

Its onset is usually in older age group i.e., beyond 40 years of age (Felson et al., 1987; Kellgren, 1961; Lowman, 1955). The number of osteoarthritis cases rises in people with advancing of age and possible beginning is as early as the third decade of life. As age
advances, there is a normal reduction in the ability of cartilage to repair itself (Sowers, 2001). The prevalence of osteoarthritis is difficult to estimate due to varying definitions and assessment criteria. While the prevalence of clinical osteoarthritis in persons aged 60 years or older is estimated to be approximately four times as that of persons of age 20 years or older (Lawrence et al., 1998).

Males and females are affected both, but it is more common in elderly women (Sarzi et al., 2005). About two-thirds to three-fourths of adults with knee osteoarthritis or osteoarthritis (regardless of region affected) are women (Jordan et al., 1995). Though osteoarthritis can occur in all joints of the body, it is more commonly seen in weight bearing joints like knee, hip and ankle joint. Knee joint is the most commonly affected joint of the body (Heine, 1926). Osteoarthritis of knee is one of the five leading causes of physical disability in elderly men and women (Brooks, 2002). Osteoarthritis usually occurs in the knee that have experienced trauma (Davis et al., 1989), infection or injury and results deterioration or loss of the articular cartilage which is a smooth slippery fibrous connective tissue that acts as a protective cushion between the bones.

Until 1980s, osteoarthritis was considered to be primarily a degenerative disorder and a natural occurrence of “wear-and-tear” on joints as a result of aging. Research evidence is now somewhat
changing this view, with the most crucial and fundamental change being the shift from thinking of osteoarthritis as a passive and degenerative disorder for which little can be done, to the realization that osteoarthritis is driven by an active disease process of the joint that can be modified by both mechanical and biochemical manipulations (Goldberg et al., 1992). The metabolically active role of the disease and the process of remodeling and repair of damaged tissue has changed thinking to the point that it is now possible to arrest the progress of disease or even reverse the progress of disease (Bland, 1983).

The need to regard osteoarthritis of different joint sites as distinct disorders due to their varying risk factors and outcomes has become apparent. While previously it was believed osteoarthritis involved only the joint, research has shown the disorder is one of the whole joint organ, involving the synovium, capsule and the bone beneath the cartilage. Furthermore, it is now known that osteoarthritis is characterized by tissue repair as well as the characteristic destruction that results in pain and disability. Many of the radiographic and clinical features of the disease that are seen are due to attempts by the damaged joint to repair itself (Dieppe, 1998). As a result of these findings, the belief that osteoarthritis is an inevitable result of "wear and tear" of joints over a lifetime is
changing. In addition, several distinctive and notable differences between aging joints and those found in osteoarthritis support these findings (Bland and Copper, 1984).

- Fibrillation in chronologically aged cartilage occurs on non weight bearing surfaces, while osteoarthritis occurs primarily in weight bearing joints.
- The biological changes in the cell that occur with osteoarthritis result in evident physical, chemical, synthetic and degradative changes, while the aging joint does not reflect these changes.
- The water content in cartilage of the aging joint does not change significantly, while the water content of cartilage in joints affected by osteoarthritis increases early in the process.
- The subchondral bone changes associated with osteoarthritis are not seen in the aging joint.

Research shows that regular, moderate use of normal joints does not increase the risk for osteoarthritis and can help maintain overall health, muscle strength and range of motion (Zhang et al., 2001). The etiology of osteoarthritis is multifactorial with inflammatory, metabolic and mechanical factors. A number of environmental risk factors such as obesity, occupation and trauma may initiate various pathological changes which result in
degeneration of articular cartilage together with changes in subchondral bone and mild intra-articular inflammation (Altman et al., 1991).

The symptoms are gradual in onset. Predominant feature is pain along with decrease in range of motion. Pain is usually non-localized and is dull in nature. Pain is worse with weight bearing and relieves with rest. As the disease progresses, movement in the affected joint becomes increasingly limited, initially as a result of pain and muscular spasm, but later because of capsular fibrosis, osteophyte formation and remodeling of bone.

Osteoarthritis has negative effect on the quality of life (Dekker et al., 1993). Patients with osteoarthritis of the weight bearing joints are less active and tend to be less fit with regard to musculoskeletal and cardiovascular status than normal controls (Minor et al., 1988; Philbin et al., 1995; Reis et al., 1995). The risk for disability attributable to osteoarthritis knee is as great as that attributable to cardiovascular disease, and greater than that due to any other medical condition in elderly persons (Doherty, 2001). Reduction in quadriceps strength in osteoarthritis knee is a significant feature. When loose bodies are there, crepitus may be elicited during motion. For the purpose of classification, osteoarthritis is described as primary (idiopathic) or secondary (if
related to a known medical condition). Clinical criteria for classification of idiopathic osteoarthritis of the knee are divided into three categories: clinical examination, laboratory investigation and radiographic features (Altman et al., 1986). Knee pain, stiffness, crepitus, tenderness and bony enlargement are seen in clinical examination. Changes are also seen in the biochemical parameters. ESR < 40 mm/hr and Rheumatoid factor < 1 : 40 are included in laboratory examination for classification. Presence of osteophytes, reduction of joint spaces and destruction of articular cartilage are seen in radiological examination.

Various medical conditions are found to be associated with secondary osteoarthritis and are potential risk factors for osteoarthritis (Al-Arfaz, 2003; Hart et al., 1995; Sturmer et al., 2001; Sun et al., 2000). These various medical conditions are Diabetes mellitus (Silvery et al., 1994; Sturmer et al., 2001) and Obesity (Bliddal and Christensen, 2006). Diabetes mellitus is a clinical syndrome which is characterized by hyperglycemia due to absolute or relative deficiency of insulin. Obesity is a condition in which there is increased amount of fat accumulation in the body. This increased amount of accumulation of fat could be due to imbalance between energy intake and expenditure.
The estimation of biochemical parameters like fasting blood glucose, lipid profile (serum cholesterol, serum triglycerides and serum high density lipoprotein-cholesterol) and serum uric acid becomes increasingly important for these diseases. Various studies have shown the association of osteoarthritis with elevated levels of blood glucose, serum cholesterol, serum triglycerides, serum high density lipoprotein-cholesterol (HDL-c) and serum uric acid (Al-Arfaz, 2003; Hart et al., 1995; Punzi et al., 2005; Sturmer et al., 2001; Sun et al., 2000). Very few studies have shown the effects of treatment programmes in osteoarthritis on these biochemical parameters (Miyaguchi et al., 2003; Nagel et al., 1992; Sato et al., 2003).

The aim of present study is to find the effects of treatment programmes in osteoarthritis knee patients with special reference to these biochemical parameters.

Generally the treatment programme of osteoarthritis is divided into three:

1. Non-pharmacological therapy
2. Pharmacological therapy
3. Surgical intervention

**1. Non-pharmacological therapy:** The treatment of osteoarthritis starts with non-pharmacological therapy. Physiotherapy plays a key role in it. The role of exercises in the treatment of osteoarthritis is
now evident and widely used in physiotherapy (Chamberlain et al., 1982; Eyigor, 2004; Kladny, 2005; Sharma et al., 2003). The main aims of treatment here are to reduce pain, to increase strength of quadriceps muscle, to increase range of motion and to improve functions. Various exercise programmes including isotonic exercises (Huang et al., 2003), isometric exercises (Sharma et al., 2003) and progressive resisted exercises (Eyigor, 2004) are believed to be useful. Also, it has been reported that dynamic exercises increase disease activity and are harmful to joint structures (Baker, 1953; Jivoff, 1975; Mills et al., 1971; Swezey, 1974). Thus, the role of aerobic exercises in particular is thought to be useful in the treatment of knee osteoarthritis (Ettinger et al., 1997; Minor et al., 1988) and reduction of biochemical parameters (Nagel et al., 1992; Sato et al., 2003). The role of aerobic exercises in osteoarthritis is not emphasized much. There is a great need of developing a balanced and integrated exercise programme for the management of osteoarthritis along with these biochemical parameters for achieving maximum physical functions and reducing several disease related complications. Non-pharmacological therapy also includes patients education about the disease, do’s and don’ts, personalized self care, weight reduction programmes, use of assisted devices and appropriate footwear.
2. **Pharmacological therapy:** The pharmacological therapy basically includes the use of oral analgesics and non-steroidal anti-inflammatory drugs. But the associated adverse effects of long use of analgesics and non-steroidal anti-inflammatory drugs on gastric system are also evident. In the patients with osteoarthritis of the knee where there is effusion and local signs of inflammation, the use of intra-articular corticosteroid injection is given. It is also evident that the excess use of intra-articular corticosteroid leads to further damage of the cartilage.

3. **Surgical intervention:** Patients with severe symptomatic osteoarthritis and who failed to respond to any treatment should only be treated with surgery. It includes joint lavage, osteotomy, partial or complete joint replacements. It should be the last treatment of choice.

Therefore, the primary treatment of choice is non-pharmacological therapy which is having the least side effects and maximum benefits. The present study entitled “Effects of exercise rehabilitation programme on osteoarthritic knee with special reference to biochemical changes” studies the effects of non-pharmacological therapy especially physiotherapy and exercises on various health related parameters in patients of osteoarthritis knee with special reference to their biochemical changes.
AIMS AND OBJECTIVES:

1. To study and compare the prevalence of various diseases like diabetes mellitus and obesity in the patients of osteoarthritis knee.

2. To study the effects of quadriceps strength, range of motion, cardiovascular fitness and functional status in patients of osteoarthritis knee.

3. To study and compare the effects of exercise rehabilitation programme for the management of osteoarthritis knee with special reference to biochemical changes.