INTRODUCTION

“*It is the soundness of the bones that ultimates itself in the peach-bloom complexion*”

EMERSON, *Conduct of life: Beauty.*

Osteoporosis is a disease that may have a tremendous impact on the lives of many postmenopausal women. Osteoporosis and its potentially devastating sequelae of fracture are increasing as the population ages, and assessment of skeletal health is an important component of a women’s routine care. “It is a progressive systemic skeletal disorder characterized by low bone mass and micro-architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture” (2). World Health Organization (WHO) defines osteoporosis as bone density (BD) that is 2.5 Standard Deviation (SD) or more below the young adult mean value (T score < -2.5). Bone density decreases with age as the fracture risk rises rapidly. Every 1 SD decrease in BMD increases fracture risk two to three fold (3).

Osteoporosis is second only to cardiovascular disease as a leading health care problem, according to the World Health Organization (4). It is now considered as major health care problem in India with an estimated 50% of healthy women and 36% men over 50 years of age having low bone mass. Occurrence of osteoporosis is 10 years earlier in Indian people than in the West (5). It currently affects approximately one in three women and one in five men over age 50. Because of related morbidity and disability, diminished quality of life and mortality, osteoporosis and fractures associated with it are major public health concern. India seems to have the highest prevalence of osteoporosis and osteopenia. With growing awareness of osteoporosis and its impact on life span especially in India, special attention is being paid to early detection, management and treatment of postmenopausal osteoporosis in women (6 & 7).

Menopause is a physiological process that occurs in healthy women usually between 45 to 55 years old, on average at about age 51. Thus, with current life expectancy, an average woman will spend about 30 years without ovarian supply of estrogen (8). A lack of estrogen in postmenopausal women prevents the absorption and utilization of calcium and is the single most important factor in the development of osteoporosis in older women (9). Each year large numbers of postmenopausal women
are diagnosed with osteoporosis\(^\text{10}\). Hence we decided to undertake this project on postmenopausal osteoporotic women.

Increase in life expectancy is another concept of formation of osteoporosis. The risk of nutritional disturbances, in particular principal element and vitamin deficiencies is high in postmenopausal women with osteoporosis\(^\text{6, 11 & 98}\). Menopause and ageing is associated with accelerated loss of bone mass. Bone loss occurs when the balance between formation and resorption is upset and resorption is excessive resulting in a negative remodeling balance\(^\text{12 &13}\). Despite its seemingly static appearance, bone is a remarkably labile tissue and bone turnover is a dynamic process which increases in postmenopausal period as a consequence of estrogen deficiency\(^\text{14}\).

Remodeling is a normal, natural process that maintains skeletal strength, enables repair of micro fractures and is essential for calcium homeostasis. During the remodeling process, osteoblasts synthesize a number of enzymes, peptides and growth factors that are released into the circulation. Their concentration thus reflects the rate of bone formation. Osteoclasts produce bone degradation products that are also released into the circulation and are eventually cleared via the kidney, which can be measured in the blood or urine and estimation of bone resorption rate can be done\(^\text{15}\). Markers of bone formation and resorption having a great importance in estimating bone turnover rates in pre and post antiresorptive therapy.

The primary effect of antiresorptive therapy is to reduce bone turnover by inhibiting osteoclastic activity, resulting in multiple secondary effects that in concert, increase in bone density and strength, preserve bone architecture and reduce the risk of fracture\(^\text{16, 17 & 18}\).

The biochemical marker for bone formation which may be clinically useful, include serum osteocalcin\(^\text{19}\). Bone specific protein such as osteocalcin or Bone Gla protein is the major & non collagenous proteins in bone matrix, associated with the process of mineralization. Another marker for bone formation includes serum alkaline phosphatase. An elevated level of serum alkaline phosphatase activity reflects increased activity of the osteoblasts\(^\text{20}\). Assay of serum osteocalcin and alkaline phosphatase can give an idea for the synthesis of organic matrix and mineralization of
bone. Determination of calcium, phosphorus, magnesium, albumin and vitamin C can provide information of the status of bone metabolism\(^{(21)}\).

We have also studied bone resorption markers mainly hydroxyproline and tartrate resistant acid phosphatase. Typically, the urinary markers of resorption or breakdown products of type I collagen include hydroxyproline, which serve as rapid predictors of changes in collagen metabolism\(^{(22)}\). Elevated levels of tartrate resistant acid phosphatase activity reflect increased activity of the osteoclast\(^{(23)}\).

In the developed countries a number of research projects are undertaken for the study of bone biomarkers, because of the current interest in osteoporosis. Similarly, in Western Maharashtra, there is a need for establishment of more rapid assays and for improvement in technical methods for measurement of these markers with a high priority in the management of osteoporosis. Therefore, in the present study we planned to assess the sensitive and specific marker of osteoblastic and osteoclastic activity in osteoporotic women.

The study was designed to offer considerable hope for better management of osteoporosis and for monitoring response to antiresorptive therapy.