SUMMARY
&
CONCLUSIONS
Summary and conclusions:

- Over a period of 3 years (2004-07), a total of 254 women patients visiting the outpatient department, BIRRD were selected for the present study.
- After excluding the women containing diseases known to affect bone metabolism, 96 postmenopausal women and 40 premenopausal women were considered as the study population.
- All the study group women were advised to take sCT (100 IU/week), Calcium carbonate (1250 mg/day) and Vitamin D₃ (250 IU/day) supplementation with regular physiotherapy for 12 months.
- Biochemical measures of bone turnover were assessed in control and study groups to understand the bone mineral metabolism, simultaneously BMD was quantified.
- Patients were carefully reviewed at monthly checkups and encouraged to adhere to treatment protocol.
- To avoid hypocalcemic condition during therapy, calcium and vitamin D supplementation was given to the postmenopausal women, 15 days before starting the treatment.
- The increased bone formation and bone resorption markers indicated that there is an accelerated loss of bone occurring at menopause than healthy premenopausal women. In the present study, loss of bone mass was confirmed with BMD results.
- Bone resorption markers rose up to 2-3 times than control group. Bone formation markers elevated slightly when compared to bone resorption markers in postmenopausal women than controls. This implies that bone formation and bone resorption markers are independent and tightly coupled.
- Among bone resorption markers serum tartrate resistant acid phosphatase-5b, an index of osteoclastic activity elevated up to 65.32% and urine CTX-I levels were
increased to a highest percent (180.65%). But urinary collagen break-down products also consists of dietary collagen. So, TRACP-5b should be considered as a specific bone resorption marker.

- Serum total alkaline phosphatase levels increased slightly. To co-ordinate the bone resorption, bone formation was also increased in postmenopausal women.

- Bone minerals, such as calcium and phosphorous levels in serum and urine were assessed in both control and study groups. The levels of urine calcium and urine calcium/creatinine ratios were increased significantly in study groups than to controls.

- After 12 months of therapy all the biochemical markers of bone turnover and BMD were assessed in study group women. Decreased bone turnover was noticed with sCT, calcium and vitamin D therapy.

- Bone resorption was rapid at early menopause stage; this is due to the rapid decline in serum estrogen levels. Estrogen deficiency, up-regulates the production of IL-1, IL-6, M-CSF, TNF-α and RANKL (Pfeitschfler et al., 2002). Simultaneously estrogen deficiency down regulates the production of OPG, insulin growth factors and TNF-β. OPG acts as a decoy receptor for RANKL.

- RANKL is expressed on the surface of osteoblast and binds to RANK (its receptor) on the cellular surface of osteoclasts. Upon the activation of RANK, a cascade of signaling events will occur that leads to differentiation and maturation of osteoclasts and protection of osteoclasts against apoptosis. And finally bone resorption will occur due to estrogen deficiency.

- Low body mass index is an important risk factor of osteoporosis. Fractures will occur commonly at low weight group. Weight increases mechanical strain and the strength of the skeleton, and ultimately this weight load improves BMD.

- In late years of postmenopausal women, estrone is quantitatively the predominant estrogen and is produced mainly from the conversion of adrenal androstenedione. Estradiol is produced through the reduction of estrone and the aromatization of ovarian and adrenal testosterone, which is derived from the conversion of androstenedione and dehydroepiandrosterone (DHEA) (Cauley et al., 1994). Estradiol could produce beneficial skeletal effects through several possible mechanisms; it reduces the activation of BMU (Steiniche et al., 1989), it may enhance the survival of osteoblasts via local cytokines or growth factors.
(Bellantoni et al., 1996) and it improves the efficiency of gastrointestinal calcium absorption and renal calcium conservation (Heaney et al., 1978).

- The annual percent change in BMD (0.96%) is very low when compared to bone markers. To analyze treatment outcome at a shorter duration (up-to 1 year), one should prefer bone markers than BMD.

- Low dietary calcium and vitamin D intake among the women reveals that, there is a need to supplement the diets of Indian postmenopausal women with calcium and vitamin D.

- Regular physiotherapy with sun shine exposure at sun rise and sun set timings were advised in all the women from their perimenopausal stage.

- The biochemical markers of bone turnover in the post treatment group of postmenopausal women are still significantly differing from premenopausal controls.

- This study reveals that a prolonged therapy (more than one year) is necessary to retard the bone loss in postmenopausal women and to equalize the bone markers with premenopausal controls.

- To study the therapeutic efficacy of sCT, calcium and vitamin D, the biochemical markers were compared in pre-treatment group of postmenopausal women (96) and post-treatment group of postmenopausal women (67) in the present study.

- A significant decline was observed with respect to bone formation and bone resorption markers in post-treatment group over pre-treatment group of postmenopausal women.