**Introduction**

The thyroid gland is one of the highly vascular organs, formed with two lobes right and left which is further connected to each other from the isthmus across the middle line. Furthermore, it is located at the front and sides of the neck; weight of thyroid is a bit variable, but is commonly about 30 grams. It becomes mildly enlarged during menstruation and pregnancy; therefore it is slightly heavier in females. (1) Thyroid volume and function may vary in obese in association with body weight and fat mass. (2) Thyroid gland influences all of the metabolic processes in human body through thyroid hormones. Thyroid disorders can range from harmless goitre to cancer; however, abnormal production of thyroid is the most common thyroid problems. Insufficient production of thyroid hormones leads to hypothyroidism while enhanced level of thyroid hormones causes hyperthyroid. (3) Hypo or hyper thyroids are related to body, heart and thyroid gland weight changes. (4) On the other hand, TSH and BMI are positively related in euthyroid patients. Moreover, TSH can be represented as marker of altered energy balance in severe and uncomplicated obese. (5)

Osteoporosis is one of the commonest metabolic diseases of bone where the bone becomes thin and fragile, creating an increased risk of fracture. Further, according to WHO Bone mineral density (BMD) 2.5 or more standard deviations below that of a young adult (T score) at any site is osteoporosis. However, defective thyroid function may be one of the important causes of osteoporosis. Nonetheless, hyperthyroidism poses a negative effect on bone metabolism while hypothyroidism in does not affect bone density in premenopausal females. (6, 7)
In 2005 two million were attributed to osteoporosis, of these 71% occurred in women. By age of 60 years, half of the women have osteopenia or osteoporosis. More than 20% postmenopausal women have prevalent vertebral fractures. \(^8\) The likelihood that any individual will suffer an osteoporotic fracture is considerable. Further, in many countries the enduring risk of a hip fracture in white women at the age of menopause lays up to 17%. The risk of osteoporotic fractures is extremely elevated. \(^9\) However, the prevalence of osteoporosis has been found to be high (53%) in peri- and postmenopausal females. There is a significant positive correlation between increasing age, low calcium intake, low BMI, lack of exercise, and low BMD. \(^10\)

The relationship of osteoporosis and thyroid hormones is controversial one. Although, Evidence suggests that elevated level of thyroid hormone is associated with impaired bone density; although, it is rare condition and may add little bit to postmenopausal osteoporosis. \(^11\) However, thyroid-stimulating hormone (TSH) does not affect BMD in euthyroid subjects and subjects with subclinical hypothyroidism. Nonetheless, thyroid hormones have more effect on cortical bone rather than trabecular bone in euthyroid subjects. \(^12\) Furthermore, TSH can also play an important role in the conservation of bone after menopause. \(^13\) Low-normal TSH values are associated with increased incidence of vertebral fractures in post-menopausal women suffering with osteoporosis or osteopenia. \(^14\)

Bone strength is predicted by both BMD and bone architecture. \(^15\) In general, thinned cortices, reduce number of trabeculae and endosteal reabsorption are hallmark features of osteoporosis in radiography. \(^16\) The WHO classified BMD into categories of normal (T-score<-1), Osteopenia (-1<T-score<-2.5), Osteoporosis (T-score<-2.5), and severe osteoporosis (T-score<-2.5 with a fragility fracture). \(^17\)
TSH has direct effects on bone remodeling, which is mediated via the TSH receptor found on osteoblast and osteoclast precursor cells. Women having subclinical hyperthyroidism and female with subclinical hypothyroidism have reduced femoral neck BMD. \(^{(18)}\) Any changes of normal thyroid function in euthyroid individuals are related with body weight variations. Moreover, thyroid hormones have positive correlation with BMI in women; though, this correlation is insignificant in male. Further, variations in thyroid function are primary, while changes in body weight are secondary. \(^{(19)}\) Moreover, physiological variation of thyroid hormones are associated with changes in BMD and nonvertebral fracture risk in healthy postmenopausal women. \(^{(20)}\) Furthermore, Obesity and subclinical hypothyroidism seem to affect BMD. Therefore, subclinical hypothyroid condition should be included during the evolution of osteoporosis as BMD can be underestimated during initial stage of osteoporosis. \(^{(21)}\) Serum calcium levels are decreased in subclinical hypothyroid and overt hypothyroidism compared to euthyroids while a negative correlation between serum TSH levels and serum calcium. \(^{(22)}\)

There is still controversy about relation between thyroid disorders, BMD, osteoporosis, long bones and vertebral column. Therefore present study is designed to fulfil in these lacunae in our understanding of impact of thyroid disorders on long bones and vertebrae.