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Research Article

**BONE ALKALINE PHOSPHATASE AND URINARY  
CALCIUM / CREATININE RATIO IN ADVANCE AGE  
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**Abstract:****Objective:** To determine the bone alkaline phosphatase and urinary calcium / creatinine ratio in advance age group.**Patients And Methods:** The tertiary care teaching hospital cross sectional study of one year (2016-17) comprised men in the age group of 45-60years without symptoms of osteoporosis and metabolic bone disorders and women in the age group of 45-60 years without symptoms of osteoporosis and metabolic bone disorders. Random urine samples were collected in clean and dry urine containers for estimation of calcium creatinine ratio. Regarding the specific investigations all the patients will have Serum BALP, urinary calcium, vitamin D, serum creatinine, urinary creatinine and urinary calcium/ creatinine ratio (calculated) whereas the frequency / percentages (%) and means  $\pm$ SD computed for study variables.**Results:** During one year study period total fifty patients were explored and study. The mean  $\pm$  SD for age (yrs) of population was  $62.41 \pm 5.72$ . BALP v/s Urinary Ca / Creatinine ratio (male) was 0.727 (r-value) and 0.001 (p-value) while the BALP v/s urinary Ca/ Creatinine ratio (female) was 0.587 (r-value) and 0.003 (p-value)**Conclusion:** This study confirms the results of previous studies showing strong positive correlation of serum BALP and urinary calcium / creatinine ratio.**Keywords:** Bone, alkaline phosphatase, calcium and urine**Corresponding author:****\*Dr. Samar Raza,**

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**INTRODUCTION:**

The stability and mobility of the body depend on the tissues that form the musculoskeletal system: bone, cartilage, dense fibrous tissue, and muscle. Bone is a dynamic tissue that is remodeled constantly throughout the life. Bone remodeling comprises of bone resorption and bone formation. Usually, these processes are balanced, resulting in 10% replacement of the bone, each year. Osteoporosis is the most common metabolic bone disease which is characterized by enhanced bone fragility, leading to pain, increase in fracture risk and skeletal deformity as the bone is unable to sustain ordinary stress. The bone turnover markers produced by osteoclasts during bone resorption are serum C-terminal pyridinoline cross linked telopeptide of type I collagen(ICTP), free gamma-carboxy glutamic acid, tartarate-resistant acid phosphatase(TRAP) and urinary calcium, hydroxyproline, pyridinoline, N-terminal telopeptide, hydroxylysine glycosides. Whereas bone formation markers measured in serum includes total alkaline phosphatase, bone alkaline phosphatase, osteocalcin, procollagen extension peptides (PINP, PICP). Bone alkaline phosphatase is the marker used most frequently to monitor bone formation. The Bone specific enzyme is a product of the TNAP gene. It is very stable and not affected by hemolysis.<sup>10</sup> Compared to most other bone markers, BAP is unaffected by renal clearance and its relatively free of diurnal influence. Urinary calcium corrected for creatinine excretion is the cheapest marker of the bone resorption. It is useful to detect marked changes in bone resorption. There is paucity of literature on studies evaluating the utility of bone alkaline phosphatase and urinary calcium / creatinine ratio in the diagnosis of diseases associated with bone loss in elderly men and also baseline characteristics of bone alkaline phosphatase is not properly established in healthy people of age group more than 45years in both men and women.

**PATIENTS AND METHODS:**

The tertiary care teaching hospital cross sectional study of one year (2016-17) comprised men in the age group of 45-60years without symptoms of osteoporosis and metabolic bone disorders and women in the age group of 45-60 years without symptoms of osteoporosis and metabolic bone disorders while the patients have no previous history of bone fracture within 6 months, no disorders known to affect bone and mineral metabolism, no abnormal renal or liver function, no prior treatment with bisphosphonates, hormone replacement therapy, fluoride therapy, calcitonin, androgens, systemic steroids or other medications known to influence bone metabolism were placed in exclusion criteria. All the patients have clinical history, clinical examination, routine investigations and blood samples were collected by venepuncture with aseptic precautions and random urine samples were collected with standard precautions. Blood samples for estimation of BALP were collected in serum vacutainers. Random urine samples were collected in clean and dry urine containers for estimation of calcium creatinine ratio. Regarding the specific investigations all the patients will have Serum BALP, urinary calcium, vitamin D, serum creatinine, urinary creatinine and urinary calcium/creatinine ratio (calculated). The data was collected on pre-designed proforma and analyzed in SPSS to manipulate the frequencies and percentages.

**RESULTS:**

During one year study period total fifty patients were explored and study. The mean  $\pm$  SD for age (yrs) of population was  $62.41 \pm 5.72$ . The demographical and clinical profile of study population is presented in Table 1. In men, the correlation between BALP and Ca/ Creatinine ratio values gave strong significance between the two parameters while in women the correlation between BALP and Ca/ Creatinine ratio values gave strong significance between the two parameters.

**TABLE 1: THE DEMOGRAPHICAL AND CLINICAL PROFILE OF STUDY POPULATION**

Parameter	Frequency (N=50)	Percentage (%)
<b>AGE (yrs)</b>		
40-49	25	50
50-59	16	32
60-70	09	18
<b>GENDER</b>		
Male	27	54
Female	23	46
<b>RESIDENCE</b>		
Urban	30	60
Rural	20	40
<b>BALP (<math>\mu\text{g/L}</math>)</b>		
Male	12.42 $\pm$ 5.41	
Female	11.93 $\pm$ 5.52	
<b>CALCIUM / CREATININE RATIO</b>		
Male	0.19 $\pm$ 0.07	
Female	0.16 $\pm$ 0.09	
BALP v/s Urinary Ca / Creatinine ratio (male)	0.727 (r-value)	0.001 (p-value)
BALP v/s Urinary Ca/ Creatinine ratio (female)	0.587 (r-value)	0.003 (p-value)

**DISCUSSION:**

The study conducted was a cross sectional to correlate the levels of BALP and Ca / Creatinine ratio in men and women of advance and also to compare both these parameters in the same groups. There was strong positive significant correlation between serum BALP and Urinary Calcium / Creatinine ratio in both the groups, men and women. Fatayerji D, et al done a study [5] to determine the effect age on bone turnover markers in men found that almost all markers including Bone alkaline phosphatase tended to be highest in the third decade, lowest in the fifth and sixth decade, with a small increase in some markers in the eighth decade. A study was done by Suresh M, et al [6] to know the Influence of years since menopause on bone mineral metabolism in South Indian women. The risk of bone resorption is greater in early years than late years of menopause. As it known that during the rapid phase of bone loss in postmenopausal women due to deficiency of estrogens, removal of calcium from bone increases plasma calcium levels, which suppresses the secretion of PTH. The PTH then causes calciuria, suppression of renal calcitriol production, and reduction of intestinal calcium absorption. The decreased bone resorption risk in late postmenopausal women might be due to increased

FSH levels. Gundberg CM et al [7]; conducted a study to evaluate bone turnover markers, found that urinary calcium/creatinine ratio was significantly high in postmenopausal group when compared with premenopausal group.

Hu Y, et al [8] done a study to evaluate bone resorption markers deoxypyridinoline and Calcium/creatinine ratio, found that urinary calcium/creatinine ratio shows a highly significant excretion of urinary calcium in postmenopausal ladies as compared to premenopausal ladies. There is a significant positive correlation between serum BALP and urinary calcium / creatinine ratio in both groups of Men and women of 45- 60years. Therefore this is suggestive of increased bone resorption when compared to bone formation in advance age which is associated with accelerated bone loss in the early postmenopausal period in women and also in men of advance age group.

**CONCLUSION:**

This study confirms the results of previous studies showing strong positive correlation of serum BALP and Urinary Calcium/Creatinine ratio. This indicates that the Serum BALP and Urinary Calcium/Creatinine ratio could be used as markers of bone turnover.

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