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Research Article

Study of Urinary Excretion of Gamma Glutamyl Transferase in Premenopausal and Postmenopausal Women

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ABSTRACT

γ -glutamyl transferase catalyses the transfer of amino acids from a substrate to other amino acid and γ- Glutamyl transferase is present in all tissues except in muscle. The aim is to evaluate the relation between GGT and bone resorption. Post menopausal women of age above 50years were investigated for the GGT in urine, Aspartate transaminase, Alanine transaminase, Alkaline phosphatase, GGT, Creatinine, Calcium and Phosphorus were performed in serum compared with the of premenopausal women. The mean urinary GGT levels of postmenopausal women were comparatively high with that of premenopausal women, i.e 44.17IU/L and 33.34IU/L respectively. The biochemical investigations had revealed that the increase in level of urinary GGT is due to renal shedding and not from the bone.

Keywords: Gamma Glutamyl Transferase, Bone resorption, Menopause, Osteoblasts.

INTRODUCTION

Gamma-Glutamyl Transferase or gamma-glutamyl transpeptidase (GGT, GGTP, gamma-GT) is an enzyme that transfers gamma-glutamyl functional groups. It is found in many tissues, the most notable one being in the liver, kidney, pancreas and intestine [1]. GGT plays a key role in the gamma-glutamyl cycle, a pathway for the synthesis and degradation of glutathione, drug and xenobiotic detoxification [2]. GGT is present in the cell membranes of many tissues, including the kidneys, bile duct, pancreas, gallbladder, spleen, heart, brain, and seminal vesicles [3]. Women excrete less -glutamyl transferase than men if activity is related to time, but the reverse is true if activity is expressed in terms of urinary creatinine (4&5).

Bone resorption occurs in all female after menopause [6] and in male age above 60years [7]. There are two main cells; osteoclasts and osteoblasts participating in bone resorption and remodelling[8]. Bone resorption is due to increased osteoclastic activity [9]. Bone remodelling is a process which must occur in all humans for a healthy skeletal make up. In process of remodelling there may be loss and gain of serum calcium. Bone markers are used to assess bone turnover in patient with osteoporosis.

Osteoporosis is the term used for diseases that cause a reduction in the bone mass per unit volume and is one of the dreaded afflictions of age [10]. There is a close relationship between estrogen deprivation and bone development. Several other factors like muscle mass, body weight, malabsorption, smoking, alcohol and genetic factors also affects density of bone [11]. Bone loss is approximately 1% per year, but accelerates to about 2% per year after menopause [12].

MATERIALS AND METHODS

The study includes 30 healthy postmenopausal women of age above 50years and 30 healthy premenopausal women of age from 20-40years. Blood sample and spot urine were obtained from the subjects as random samples. The blood samples were collected in EDTA coated vaccutainer. The blood sample was centrifuged at 3000rpm for 3min. The serum obtained is used for estimation of the following parameters.

All the estimations were performed in fully automated auto analyzer using the kits by **Beckmann Coulter** for analyzing Urinary GGT, Serum GGT, Serum Aspartate transaminase(AST), Alanine transaminase(ALT), Alkaline phosphatase(ALP), Calcium, Phosphorus and Creatinine. The institutional ethical committee approved the study and informed consent was obtained from the patients. Patients with Diabetes Mellitus, Coronary heart disease, Hepatic disorders and renal disorders were excluded. Independent t-test was done to analyse the results using the SPSS version 15.

RESULTS AND DISCUSSSION

The individual range of urinary GGT in this study is 6-96 IU/L and the statistical mean value being 34 IU/L for premenopausal group and 44 IU/L for postmenopausal group. Hence, it is seen that there is only statistical significant increase but not the individual increase in urinary GGT levels for both the groups.

This study mainly concentrates on the bone resorption during menopause. In the selected subjects, the cortical bone density is not declined but the trabecular bone density was slightly decreased which indicates that the resorption is not severe. The other biochemical parameters like Calcium, Phosphorus and ALP assessed in this study has shown alteration in the values comparatively (13).

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Table 1: SERUM AND URINARY LEVELS OF GGT

Parameters	Premenopausal(n=30)	Postmenopausal (n=30)
Serum GGT	29.13±8.14	36.5±10.2**
Urinary GGT	33.34±24.76	44.17±23.86

Table 2: SERUM LEVELS OF AST, ALT AND ALP

Parameter	Premenopausal (n=30)	Postmenopausal (n=30)
AST	20.20±6.74	20.16±3.86**
ALT	17.30±8.40	17.03±4.14**
ALP	56.03±17.88	76.43±19.88

Table 3: SERUM LEVELS OF CALCIUM, PHOSPHORUS AND CREATININE

PARAMETER	PREMENOPAUSAL (n=30)	POSTMENOPAUSAL (n=30)
CALCIUM	9.30±0.46	9.30±0.43
PHOSPHORUS	4.47±0.64	3.86±0.49***
CREATININE	0.74±0.11	0.88±0.56

*The level of significance is indicated by **

**- p value <0.005 (significant)*

***- p value<0.001 (highly significant)*

There are many studies stating the increase in serum alkaline phosphatase and decrease in serum phosphorus in patient with osteoporosis. The results indicate that ALP and phosphorus are statistically significant (p value <0.001) and there is no significant increase in serum ALT, AST and creatinine, indicating that there are no hepatic, renal and cardiac disorders. It was found that serum ALP was elevated and serum phosphorus was decreased suggesting that there is bone resorption, since there is calcium equilibrium maintained between bone and serum there is no increase in serum calcium level. These criteria confirm that there is bone resorption in the postmenopausal group.

Statistically, the mean value of urinary GGT was higher in postmenopausal women compared to the premenopausal women. Individually, it was not significant marker for bone resorption since the values range is almost the same in both groups (upto 80 IU/L and upto 100 IU/L). Hence, the individual increase of urinary GGT may be due to epithelial shedding from Proximal Convoluted Tubule of Nephrons.

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