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URINARY TRACT STONE DISEASE

SERUM AND URINARY CALCIUM IN STONE FORMERS AND NON-STONE FORMERS

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ABSTRACT... Aims & Objectives: Geographical variation in the rates of kidney stones has been observed for many years. Pakistan is situated in stone belt. Calculus diseases is endemic in Pakistan, perhaps the incidence in Pakistan is highest in the world. **Purpose:** To evaluate etiology and biochemical risk factors (inorganic phosphate) in the Peshawar. **Subjects & Methods:** Study was conducted at LHR and Hayatabad Hospitals of Peshawar for the period of nine months. Two hundred patients and same number of controls were selected. **Results:** The mean value of mean inorganic phosphate in non stone formers were less than that of stone formers. The mean of urinary inorganic phosphate excretion in stone formers was greater than that of non-stone formers. **Conclusions:** We conclude that inorganic phosphate is an independent risk factor for renal stone formation.

Key words: Serum inorganic phosphate, urinary in organic phosphate, kidney stone.

INTRODUCTION

Urolithiasis of formation of urinary calculi at any level of the urinary tract is a common condition. Urinary calculi are world wide in its distribution but are more common in some geographic areas as in parts of United States, South Africa, Pakistan, India and South East Asia. Geographical variation in rates of kidney stones has been observed for many yeras[1,2]. It is estimated that approximately 2% of the population renal stone disease at sometimes in their life with a male to female ratio of 2:1. The peak incidence is observed in 2nd and 3rd decades of life. Renal calculi are characterized clinically by renal colic as they pass down along the ureter and manifest as hamaturia[3].

No single theory of pathogenesis can properly account for human kidney stone, they are too various and their formation is too complex for simple understanding. Using human tissue biopsies, intraoperative imaging and such physiology data from ten different stone forming groups, we have identified at least three pathways that lead to stones. The first pathway is overgrowth on interstitial apatite plaque as seen in idiopathic calcium oxalate stone formers, as well as stone formers. In the second pathway, there are crystal deposits in renal tubules that were seen in all stone forming groups except the idiopathic calcium oxalate stone formers. The third pathway is free solution crystallization[4]. Recent studies have suggested a defect in phosphate balance as a significant underlying cause of calcium urolithiasis[5]. Present study was planned to examine the relation between inorganic phosphate and upper urinary tract diseases.

SUBJECTS & METHODS

Two hundred patients with upper urinary tract stone disease were selected same number of healthy controls were also added. The study was carried out at Lady reading Hospital, Hayatabad Medical Complex, Peshawar for the period of nine months. The detailed clinical history and physical examination were carried out. A proforma giving detail of patient's history and family history was filled for each patient. The diagnosis of urinary stone in upper tract was made by X-Ray evidence of stone in renal or ureteric area and history of spontaneous passage fo stone in the urine. Microscopic examination of urine was carried out. The patients having serum creatinine of more than 1.3mg were also included in the study. 5cc of blood samples were collected from subjects with aseptic measures during early morning time for estimation of serum cretainine & inorganic phosphate, that were measured by Jaffe's reaction and molybdenum blue method respectively student's "t" tested was done for statistical significance in between various parameters.

Serum inorganic phosphate in stone formers (S.F) and nn-stone formers (N.S.F)

The calculated mean levels of serum inorganic phosphate are shown in table. The mean ± S.D of 200 stone formers and 200 non-stone formers ws 5.07 ± 1.22 mg/dl and 4.65 ± 0.39 mg/dl respectively. The mean value in N.S.F is less than that of S.F and the difference is statistically significance (P<0.05).

Urinary phosphate excretion

The mean of urinary inorganic phosphate excretion in S.D (1017 ± 0.915 mg/24 hours) is greater than that of N.S.F (837.02 ± 19.03 mg/24 hours) and statistically it is significance (P<0.05).

Table. Serum/Urinary inorganic phosphate level

	Serum		Urinary Excretion	
	S.F	N.S.F	S.F	N.S.F
	mg/dl		mg/24 hours	
Mean ± S.D	5.07 ± 0.22	4.65 ± 0.39*	1017 ± 0.915	837.02 ± 19.03*

** = P<0.05*

Stone formers (S.F) and non-stone formers (N.S.F)

DISCUSSION

Parathyroid gland regulates the serum concentration of calcium and inorganic phosphate. Their product is always constant. Thus they are inversely related to each other. In our study at Peshawar, it was seen that serum inorganic phosphate as 5.07±1.22mg/dl and 4.65±0.39mg/dl in S.F and N.S.F respectively. Shah Jehan and Rehman demonstrated serum inorganic phosphate as 3.83 ± 0.34 and 3.43 ± 0.28 mg/dl in control adults and stone former adults respectively[6]. The difference is statistically not significant. Khanum has demonstrated serum inorganic phosphate as 4.75 ± 0.22 and 5.11 ± 0.13 mg/dl in controls and stone formers respectively[7]. The difference is being statistically not significant. Hussain showed serum inorganic phosphate as 3.99± 0.39, 3.81±0.69 and 3.57±0.96mg/dl in controls, sign episode S.F and recurrent S.F[8]. The difference between the three groups are being statistically not significant. If we compare the serum levels of inorganic phosphate of these four studies it is evident that our study at Peshawar showed statistically significant difference regarding inorganic phosphate which acts as a definitive risk factor in the upper urinary tract stone disease. Khanum reported daily excretion of inorganic phosphate as 268.61±16.00 and 272.88±1.89 mg/day respectively in stone former and non stone former. While Shah Jehan and Rehman, reported urinary excretion of inorganic phosphate 530.0±0.05mg/day and 630±0.06mg/day in S.F and N.S.F respectively[6]. Hussain et al, reported a urinary excretion of inorganic phosphate 26.3±6.59, 30.22±8.74 and 28.37±9.82 in N.S.F, S.F and control. He showed that this difference is not statistically significant[8]. In comparison of these studies with our study urinary excretion of inorganic phosphate is 1017±0.915 and 837.02±19.03 in S.F and N.S.F. In our study it was statistically significant. The difference may be due to the fact that increased meat consumption in Peshawar may produces hyperphosphaturia, the effect of increased parathyroid hormone and those having a positive family history are at increase risk of upper urinary tract stone disease.

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"Hope never abandons you; you abandon it"

(George Weinberg)