Study of bone markers and fluoride levels in adult men with skeletal fluorosis .

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ABSTRACT
Objectives: *Fluorosis is a serious problem in many parts of the world, where drinking water contains more than 1ppm of fluoride level. The most prominent types of endemic fluorosis are dental fluorosis and musculo skeletal fluorosis in growing children, adult men and women. The present study was designed to investigate the bone markers in terms of serum calcium, inorganic phosphorous, and alkaline phosphatase along with serum flouride levels combined with levels of urinary calcium and fluoride in adult males with skeletal fluorosis living in endemic fluorotic area to know the metabolic changes in bones as consequence of skeletal fluorosis for early detection and better treatment.*
 Material and methods: *the study includes 60 adult males of age 30-50 years divided into 2 groups, group-1 includes 30 controls, normal healthy adult males living in non endemic fluorotic area and group-2 includes cases, adult males with skeletal fluorosis living in endemic fluorotic area. Peripheral venous blood sample was collected into clean, dry test tubes and was allowed for clot formation .*
Thus separated serum was used for investigating serum calcium, inorganic phosphorous, fluoride, and alkaline phophatase. SpotUrine sample were collected to estimate calcium and fluoride levels.
 Results: *Data was analyzed by MS-excel, SPSS17.0 software system. Comparison of two groups done by student's t test. In the present study the mean values of serum calcium in cases is 9.15 +/- 1.24 mg/dl and in controls it is 9.46+/-0.70 mg/dl (p>0.001). The mean value of serum inorganic phosphorous in cases is 4.22+/-0.47mg/dl and in controls it is 3.27+/-0.28 mg/d (p<0.001)l. The mean value of serum fluoride in cases is 0.19+/-0.02 mg/dl and in controls it is 0.07+/-0.01 mg/dl (p<0.001). The mean value of serum Alkaline phosphatase in cases is 8.64+/-1.81 U/L and in controls it is 5.61+/-1.10 U/L (p<0.001) . The mean value of urine calcium in cases is 11.48+/- 2.28 mg/dl and in controls it is 21.42+/-3.44 mg/dl (p<0.001) . The   mean value of urine fluoride in cases is 2.20+/-0.95 mg/dl and in controls it is 0.62+/-0.12 mg/dl (p<0.001). There is significant changes in all the parameters in cases when compared to controls.*
Conclusion: *In the present study there is significant increase in serum fluoride, inorganic phosphorous and urine fluoride in cases when compared to controls. There is significant increase in serum alkaline phosphatase in cases compared to controls. There is significant decrease in serum calcium and urine calcium in cases when compared to controls. This study may be useful to know the risk factors of skeletal fluorosis and forms an area of research work which if detected early can be managed accordingly and prevent the complications of fluorosis.*

I. Introduction

Fluorosis is a serious public health problem in many parts of the world where drinking water contains morethan 1ppm of fluoride[1]. Prominent among them are India, China, Japan, Srilanka[2]. In India, based on a number of field studies, endemic fluorosis is now recognised as public health problem in the states of andhrapradesh,Gujarat, Karnataka, Tamilnadu. In Andhrapradesh, the major packets of endemicity are located in the districts of ananthapur, Guntur,Krishna,nalgonda,Nellore, prakasam and chittoor districts. Endemic fluorosis in India with skeletal and dental changes was first reported from surveys in Nellore district by shortt et al(1973)[3].

The most prominent types of endemic fluorosis are dental fluorosis and skeletal fluorosis. Chronic ingestion of relatively low levels of fluoride causes dental fluorosis and chronic ingestion of high doses of fluoride can cause skeletal fluorosis. Excess fluoride gets accumulated in calcified tissues like bone and teeth[4]. Fluoride deposition in bone is inversely proportional to age[5].the newly formed bone with fluorapatite structure is poor in crystalline and matrix strength.alteration in bone metabolism is a basic feature of flurosis.

Age,sex,calcium intake in the diet, hormonal status, dose and duration of fluoride intake and renal efficiency in fluoride handling are the factors which influence the outcome[6].

Objectives: The present study was designed to investigate the bone markers in terms of serum calcium,serum inorganic phosphorous, along with serum alkaline phosphatase and fluoride levels, combined with urinary calcium and fluoride in adult men to know the effect of skeletal fluorosis in endemic flurotic area. All the above parameters were investigated in adultmen with skeletal fluorosis in endemic fluorotic area and are compared with that of normal healthy adult men living in non endemic fluorotic area.

II. Material and methods

The present study was carried out in the department of Biochemistry, SV medical college, Tirupathi. The study includes 60 adult males divided into 2 groups, group-1 includes 30 controls, normal healthy adult men living in non endemic fluorotic area and group-2 includes cases, adult men with skeletal fluorosis living in endemic fluorotic area. Peripheral venous blood sample was collected into all the clean, dry test tube and was allowed for clot formation . The sample is centrifuged and thus separated serum is used for estimating serum calcium,serum alkaline phosphatase and urine calcium by using semi auto analyser. Serum inorganic phosphorous,serum fluoride, urine fluoride were estimated by using ion selective electrode (orion).

Inclusion criteria: Adult males of age group 30-50 years with skeletal fluorosis and apparently normal healthy adult men of age group 30-50 years.

 Exclusion criteria: Adult men with age group of 30-50 years wth the history of HTN, diabetes mellitus, cardiovascular disease, chronic renal failure and liver disease.

III. Results

Data was analyzed by MS-excel, SPSS17.0 software system. Comparison of two groups done by student's t test. In the present study the mean values of serum calcium in cases is 9.15 +/- 1.24 mg/dl and in controls it is 9.46+/-0.70 mg/dl (p>0.001). The mean value of serum inorganic phosphorous in cases is 4.22+/-0.47 mg/dl and in controls it is 3.27+/-0.28 mg/d (p<0.001)l. The mean value of serum fluoride in cases is 0.19+/-0.02 mg/dl and in controls it is 0.07+/-0.01 mg/dl (p<0.001). the mean value of urine calcium in cases is 11.48+/- 2.28 mg/dl and in controls it is 21.42+/-3.44 mg/dl (p<0.001).The mean value of urine fluoride in cases is 2.20+/-0.95 mg/dl and in controls it is 0.62+/-0.12 mg/dl (p<0.001). the mean value of serum Alkaline phosphatase in cases is 8.64+/-1.81 U/L and in controls it is 5.61+/-1.10 U/L.There is significant changes in all the parameters in cases when compared to controls.

mean values of serum inorganic phosphorous and alkaline phosphatase in 2 groups.
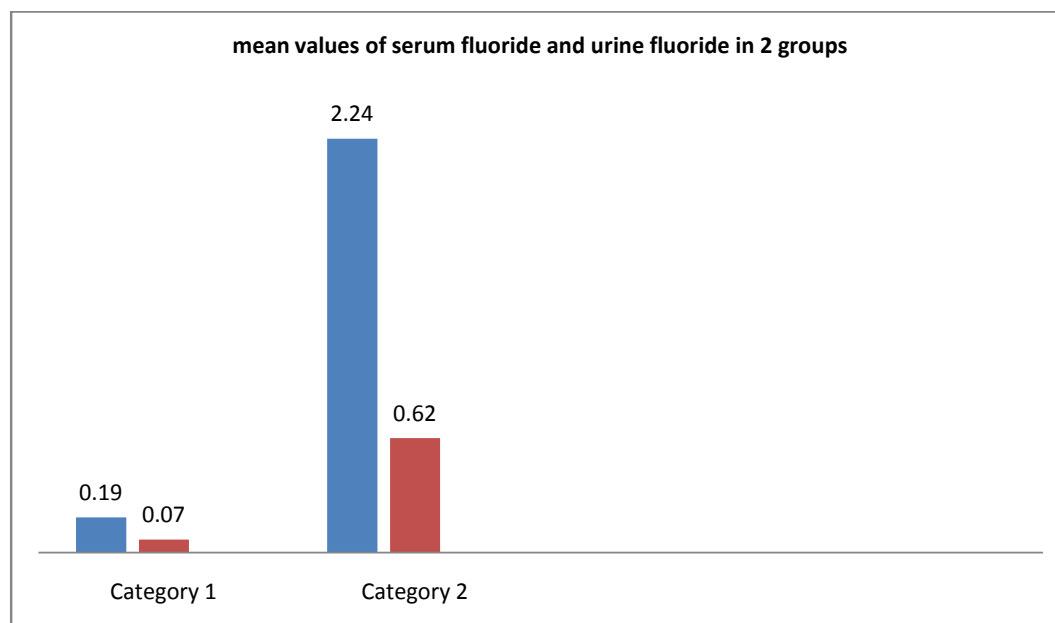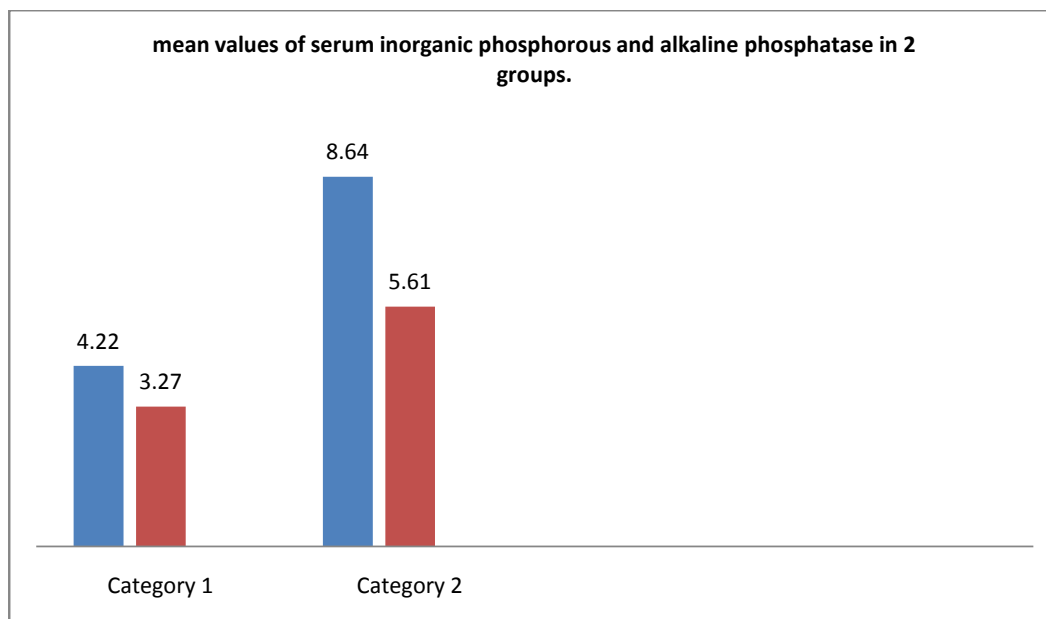
IV. Discussion

In the present   study the mean values of serum calcium in cases is 9.15 +/- 1.24 mg/dl and in controls it is 9.46+/-0.70 mg/dl (p>0.001). the difference between 2 groups was not significant. The mean value of serum inorganic phosphorous in cases is 4.22+/-0.47 mg/dl and in controls it is 3.27+/-0.28 mg/d (p<0.001), the difference between the 2 groups was statistically significant. The mean value of serum fluoride in cases is 0.19+/-0.02 mg/dl and in controls it is 0.07+/-0.01 mg/dl (p<0.001), the difference between thee 2 groups was statistically significant. the mean value of urine calcium in cases is 11.48+/- 2.28 mg/dl and in controls it is 21.42+/-3.44 mg/dl (p<0.001) the difference between the 2 groups was statistically significant .The mean value of urine fluoride in cases is 2.20+/-0.95 mg/dl and in controls it is 0.62+/-0.12 mg/dl (p<0.001), the difference between the 2 groups was statistically significant. the mean value of serum Alkaline phosphatase in cases is 8.64+/-1.81 U/L and in controls it is 5.61+/-1.10 U/L (p<0.001) the difference between the 2 groups is statistically significant.. In the present study There is significant changes in all the parameters in cases when compared to controls.

V. Summary and conclusion

The present study was done to assess the metabolic changes in bone in skeletal fluorosis in endemic fluorotic area in adult men by estimating serum calcium,serum inorganic phosphorous,serum alkalinephosphatase,urine calcium and urine fluoride. We compared all the parameters with age matched controls living in non endemic fluorotic area. There is statistically significant increase in the mean values of serum inorganic phosphorous, serum fluoride,serum alkaline phosphatase and urine fluoride in cases when compared to controls. There is statistically significant decrease in the mean values of serum calcium, and urine calcium in cases when compared to controls. This study may be useful to study the risk factors of skeletal fluorosis and forms an area of research work which if detected early can be managed accordingly and prevent the complications of fluorosis.

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