

REFERENCES VALUES OF SERUM CALCIUM AND PHOSPHATE IN BASRAH AREA⁺

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Abstract

Biochemical constituents in blood of healthy individual are subject to variation and the influence of several factors. Difference can be seen in the normal range established for populations living under different environmental and dietary condition. Age and sex are factors effect the normal considerably. Normal reference range was studied by using blood samples (360) males and (210) females using manual methods. The study shows no statistically significant differences according to sex. The comparison of Basrah mean values with other study show no significant differences of both sexes.

المستخلص

القيم الطبيعية تحصل بعض الاختلافات للناس الذين يعيشون في ظروف مختلفة سواء كانت ظروف المناخ أو الطعام. العمر والجنس من العوامل التي تؤثر على القيم الطبيعية. تمت دراسة القيم الطبيعية بواسطة فحص نماذج دم لأصحاء (٣٦٠) رجال و(٢١٠) نساء باستعمال الطرق اليدوية. الدراسة وضحت بأنه لا توجد اختلافات أحصائية باختلاف الجنس. تمت مقارنة المعدل الطبيعي مع بقية الدراسات لوحظ أنه لا توجد اختلافات أحصائية لكلا الجنسين.

Introduction

The establishment of normal ranges of biochemical parameters for each country is necessary to enable clinician to arrive at a correct diagnosis, making use of laboratory results [1].

The normal reference ranges for a given constituents of clinical interest can be defined as "The concentration of the constituents found in a group of clinically health person". Values found in 95% of normal healthy persons are usually used as the normal reference range [2]. This study was established the normal values of calcium and phosphorous appropriate to Basrah city for both sexes.

Calcium is the most abundant mineral in the body. There is being about 25mol(1 kg) calcium in a 70 kg man. Calcium circulates in plasma in two forms that bound to albumin accounts for a little less than half of total calcium as measured by routine analytical method. Most of the rest of calcium is free and ionized (Ca^{+2}) [2].

In infancy and childhood positive balance especially at time of active skeletal growth. Most calcium is in the bone and prolonged deficiency cause bone disease [2].

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.Insufficient dietary calcium and reduction in the calcium and phosphorous ratio may favour the appearance of both these condition by promoting bone reabsorption [3] . Serum calcium and inorganic phosphorous were investigated serially during menstrual follicular ,ovulatory and luteal phases of menstrual cycle in 25healthy medical student volunteers .calcium level was highest during physiological limits and in ovulation and lowest during luteal phase [4] .

Calcium level decrease in pregnancy .Calcium metabolism became insufficient only in the second half of pregnancy [5] .

Calcium and phosphorous absorbed from small intestine ,and is considerably influenced by hormonal action .Two hormones are known to involved in the control process parathyroid hormone (PTH) and 1:25- dihydroxy cholecalciferol , these hormone both acts to increase plasma calcium concentration and plasma calcium concentration ,importance of the calcium lowering hormones calcitonin and katacalcin is less well established [6] .

The calcium and phosphorous excreted in urine and feces .Above sixth of the daily intake of calcium excreted in feces, and remaining sixth in the urine. Except for the portion of phosphate that is excreted in feces in combination with calcium , almost all the dietary phosphate is absorbed into the blood from the gut and later excreted in the urine [7] .

The increased of calcium named hypocalcaemia .The cause of hypocalcaemia are hyperparathyroidism .Carcinoma in the bone ,excess intake of vitamin D or calcium or both [6] .

The decrease of calcium called hypocalcaemia .The main causes of low plasma [calcium] occur in chronic renal failure, deficiency of vitamin D, hyperparathyroidism, rickets and tetany [6] .

The phosphorous excreted in urine and feces .The amount of phosphorous excreted in urine is more influenced by the amount in the diet [8] .

There is considerable variation in plasma [phosphate] during the day, especially following meals and reference values only related to specimen collected under fasting condition , these values show considerable variation with age during infancy and childhood .

The body contains about 17mol(530g) phosphorous of this 87 percent is present in the bones so it is widely distributed in the body [8] .

The increase of phosphorous found in chronic nephritis ,renal failure ,in the final staged when uremia coma is present .A decrease is usually found in rickets . In osteomalacia ,hyperparathyroidism .There is normal physiological full to below (3.1 mg,1100 ml) when increase carbohydrates utilization .

Drugs may effect the serum inorganic phosphorous value anti acid containing aluminum salt reduced intestinal absorption , also oestrogen or contraceptive pill and phenobarbitone .Increases in serum inorganic phosphorous are seen during treatment with androgens or thiazid diuretics [8] .

Materials and Methods :

Blood samples were collected from 360 males ,210 females . The skin in autecubited fassa was cleaned with swabs containing sprit and allowed to dry before venepuncrure . Venous blood was collected with 5 ml syringe .

Minimum venous stasis was employed to prevent haemoconcentration and the blood drawn with very gentle traction on the syringe plunger to avoid heamolysis .The

needle is removed and the blood was transferred to screw- capped plain glass tubes and allowed to clot at room temperature to separate serum .

The calcium determined by calorimetric method without deproteinization using o-crosolphthalein complex one interference due to Mg^{+2} ions is elimination by 8-hyoxuguinoline .

The inorganic phosphorous determined by colorimetric determination without deproteinization of serum phosphorous using a single reagent which forms a phosphomolybdate complex in the presence of a reducing agent (ferrous sulphate).

Results :

The data obtained in this study is analyzed by manual method for calcium and phosphorous . This study was performed on 570 healthy adult which were student ,government employees , and other employees .

The data classified according to the sex to demonstrate the effect of normal range . The variation of reference range was studied in males and females and total according to sex as shown in table below . The statistical variation of the parameters were investigated by using mean, standard (SD) and student T- test .

The table show the normal range of calcium and phosphorous of total, male and female .

The study showed no statistically significant differences related to sex . This was similar to the result reported by Robert 1967 .

Group	No.	Normal range Mg/ 100ml mean $\pm$ 2sD		Normal range Mg /100ml Roberts 1967	
		calcium	Phosphorous	Calcium	phosphorous
Male	360	9.0-10.5	2.2-4.3	9.0-10.4	2.3-4.2
Female	210	8.9-10.3	2.0-4.3	8.7-10.4	2.2-4.2
Total	570	9.0-10.5	2.2-4.3	8.8-10.4	2.4-4.2

Discussion :

A study of reference values requires conceptual statistical biologic and methological consideration . The idea of establishing reference values makes the situation easier for rational interpretation of a patient result by comparing it to reference values . Since many factors may influence sex ,race environment, analytical procedure and many others .

It is considered reasonable if no essential that laboratories with appropriate facilities and experience in different countries should establish their own reference values [9] .

Pollard has demonstrated a regular diurnal phosphate , which fall to minimum between the hours of 10 a.m and 12 midday [10] . The sex difference of serum calcium (males > females) is corroborated by the fact that a similar difference is observed for serum albumin level , because in a report by Rawson and Sunder man it was shown

that calcium was equally bound by the albumin and globulin fraction of the serum protein. A sex difference was also found by Pryce and Wooton in their observation on a hospital population but in contrast to this report their female values were higher than the male values [11] .

The normal reference range values of blood specimens (n =360 male volunteers and n = 210 female) from different part of Basrah area . The influence of sex on the concentration of various body constituents is well established [12] ,[13] ,[14] and[15]

The normal reference range of calcium and phosphorous studied is little higher in males than in females . This was similar to result reported by(Robert ,1967)as show in the table .

Reference:

- 1- El – Hazmi ,M.A.F., AL –Falect ,F.Z., AL- Mofleh ,L.A., Warsy ,A. J.and Al-Askah , Ak. “ study of normal values ” *Trop. Geogr. Med* vol. 34- NO.2 ,PP.323, 1982 .
- 2- Zilva ,*clinical chemistry in diagnosis and treatment* , 15th edn. p172-174 , 1988 .
- 3- Ortega –RM; Encian- Sotillos –A, Anders –p;Lopez- Sobaler –Am;GuintasE. *Nutr.Hosp.* NO.-dec,13(6) ;316-9, 1998 .
- 4- Pandua – AK; Chandwani S; Das –TK; Pandya –KD ,*Indian –J- physiol pharacol* . Oct;34(4) ,41-4 ,1995 .
- 5-Saito – H;Saito–M,Saito –K.,Terauchi –A;Kobayasshi –T; ominaga- T;Hosoi – E *Am.- J-Med. Sci.*Apr. ;297(4):247-50 ,1989 .
- 6-L.G. White by Iw Percy Robb A.F. Smith *Lecture notes on clinical chemistry* p.277-279 .
- 7- Arthur C. Guxtom ,M.d; *Textbook of medical physiology*,17 th edn. p.937,1986 .
- 8- Varely , H., Gowenlock A. H., Bell M. *practical clinical biochemistry* , Great Britain by the White Fri and press, London and Tonbride , 15 th edn. vol. 1 , p1014,887,888 .
- 9- Hadidy S., Bazerbashi M. B., Tobbahh H. *The Arab. J. of Med.* vol . 14 ,1985 .
- 10- A. C. Pollard ; *Technicon symposium London* , 1964 .
- 11- J. D. Dryce and I.D.P. Wotton ,*Proc. Assoc. clin. Biochem .*, Aug .;p. 63 . 1964
- 12- Roberts ,L.B. *clin. chim acta* vol. 16 P. 69 .
- 13- Werner M. Toll, RE Hultin J.V and Mellecker J. A. *Clin . chem.; clin. bio. chem.*vol .8 p. 105 .
- 14- Wilding p., Rollasson J. G., Robinson , D. *clin. chim. Acta* vol 41 , p. 375 .
- 15- Diagneault R., Gange M. and Lehelsier G., *In advances automated analysis echnicon international congress* , vol. 21 medied Inc. 1975 .