

Increase of Alkaline Phosphatas in Polycythemia Vera Among Iraq Patients.

Athraa Zaidan Hassan

Medical Laboratory Science Technology, Collage Of Health And Medical Technology

Athraa_Za@yahoo.com

Abstract

Polycythemia is an increase in haemoglobin and red blood cell count which reflecting increase in total red blood cell volume due to an abnormal gene. this study aimed to ascertain effects of polycythemia on the selected serum alkaline phosphates . Blood specimens were collected from forty one polycythemic subjects and thirty subjects with no evidence of polycythemia (control) who are admitted to the Al-kindy hospital in Baghdad city during period from October 2014to february 2015with age range (20-70)years. The results showed that most of patients were females (68.3%) rather than males (31.7%).and also we notice that the majority of patients were at the age between (<20-29) years with (29.3%)and (40-49)years with (22.0%) while it was observed that patients between (50-59) were (12.2%).

Packed cell volum (PCV) which was determind showed increase in packed cell volum with the a highly significant difference ($p<0.01$) between patients group and control group in comparsion between them.

Our investigation appeared that mean values of serum alkaline phosphates show highly significant ($P<0.05$) in polycythemic pateints in comparsion with the mean values in the control group . In conclusion , the current study has been shown the status of the serum alkaline phosphatase influenced by polycythemia. It is therefore recommended that this parameter with other biochemical parameters such as (uric acid, calcium, cholesterol, creatinine) should be quantitatively measured in all polycythemic subjects and be reversed to normal levels upon the findings of elevated values in order to prevent any subsequent complications.

Keywords: Polycythemia, Serum alkaline phosphates, Effects, Iraqi pateints

الخلاصة

Polycythemia هو زيادة في الهيموجلوبين وعدد خلايا الدم الحمراء مما يعكس ارتفاع إجمالي حجم خلايا الدم الحمراء بسبب وجود جين غير طبيعي. وكان الهدف من هذه الدراسة للتأكد من آثار كثرة كريات الدم الحمراء على المصل اختبار الفوسفات القلوية (alkaline phosphates) .

تم جمع عينات الدم من واحد و أربعين شخص مصاب بالزوجة الدم (polycythemic) وثلاثين شخصا غير مصاب او ليس لديهم أي دليل على كثرة كريات الدم الحمراء (كمجموعة سيطرة) الذين يدخلون إلى مشفى الكندي في مدينة بغداد خلال الفترة من أكتوبر 2014الى فبراير 2015 بمعدل فئة عمرية تتراوح بين (20-70) سنة .

وأظهرت نتائج هذه الدراسة أن معظم المرضى من الإناث بنسبة (68.3%) اكثر من الذكور (31.7%). وأيضاً نلاحظ أن غالبية المرضى الذين كانت أعمارهم بين (<20-29)سنة مع (29.3%) و (40-49) سنة مع (22%)، في حين لوحظ أن المرضى ما بين (50-59)سنة كانت (12.2%). حجم كريات الدم الحمراء (PCV) والتي حددت في هذه الدراسة اظهرت زيادة في حجم كريات الدم الحمراء مع وجود فرقا معنوياً كبيراً ($P<0.01$) بين مجموعة المرضى مقارنة بالمجموعة السيطرة. كما ان نتائج هذه الدراسة قد اظهرت ان قيم المتوسط لانزيم الفوسفات القلوية (Alkaline phosphstes) في دم المرضى المصابين بلزوجة الدم (polycythemic) كان اعلى فرقا معنوياً ($p<0.05$) مقارنة مع متوسط القيم في مجموعة السيطرة . نستنتج من هذه الدراسة ان وضع انزيم الفوسفات القلوية (Alkaline phosphates) يتأثر بكثرة كريات الدم الحمراء لذلك نوصي بان هذا المعامل (Alkaline phosphates) مع معلمات كيميائية اخرى مثل (حامض اليوريك , الكالسيوم , الكولسترول, الكرياتينين) يجب ان تقاس كمياتها في الدم في كل المرضى المصابين بلزوجة الدم و عكس إلى المستويات الطبيعية بناء على نتائج القيم المرتفعة من أجل منع أي مضاعفات لاحقة.

الكلمات المفتاحية: احمرار الدم، مصلى اختبار الفوسفات، مؤثرات، المرضى العراقيين.

Introduction

Polycythemia which is also referred to as polyglobulia which revealed that elevated level in haemoglobin and the red blood cells count above normal range with a resultant elevation of total red cells volume arising from an abnormal gene (Maran & Pichal, 2004). Clinically, polycythemia is established when haematocrit (PCV) level is greater than 55% in males and 47% in females (Ramnik, 2006). Three kinds of polycythemia: primary polycythemia, secondary polycythemia and stress polycythemia that are dependent on age and lifestyle.

Primary polycythemia called also the true polycythemia or polycythemia vera is rarely seen, it is caused by clonal which leads to the excessive in red blood cells production, white blood cells, platelets also their progenitors (Streiff *et al.*, 2002, Scott *et al.*, 2006, Campbell *et al.*, 2005). It is an uncommon disease with an incidence of at least 22 per 100,000 population (Ma *et al.*, 2008).

Secondary polycythemia is caused by an increase in the red blood cell production in bone marrow. the reason for this case is decrease in level of oxygen in blood, that can be as a result of several reasons such as pulmonary disease resulting in cardiovascular disease, high altitude residents where oxygen levels are naturally low, hypoventilation associated with obesity, heavy smoking, exposure to chemicals e.g. nitrites, sulphonamides, other substances producing methaemoglobin and sulphaemoglobin, various alcohols etc (Ramnik, 2006, Siebolts *et al.*, 2009). Stress polycythemia is a type in which the red cells production is normal, but the volume of blood plasma is decreased. This however, may result from dehydration, plasma loss such as burns, enteropathy etc (Ramnik, 2006).

All the various types of polycythemia have similar symptoms which may include: headache blurred vision and plethora (Ramnik, 2006, Lippert *et al.*, 2006). others include pruritus or itching particularly after exposure to warm water such as taking a bath. (Saini *et al.*, 2010). which may be influenced by abnormal histamine release (Fjeliner *et al.*, 1979) or prostaglandin production (Steinman *et al.*, 1987). Peptic ulcer is another disease that is also common in patients with polycythemia vera, and it is presumed to be due to increased histamine released from mast cells, which may be related to an increased susceptibility to infection with the ulcer causing bacterium *H. pylori* (Torgano *et al.*, 2002).

The etiology of polycythemia which is not a new disease still remains obscure as there is no consensus regarding its therapy after ten decades of careful clinical and laboratory investigations (Ramnik, 2006). Hence the aim of this study was to ascertain the effects of the disease on serum alkaline phosphates parameter in Iraqi pateints .

Materials and Methods

A total of forty one polycythemic subjects aged 20-70 years whose haematocrit (PCV) were $\geq 55\%$ were attending in Al_kindy Hospital in Baghdad city were recruited for this study. They comprise of thirteen males and twenty eight females

for the patients . the current study , no attempt was made to analyze and classify the polycythemia. The control groups consisted of thirty subjects recruited for this study, aged 20-70 years whose hematocrit (PCV) were between 35% and 42%. They comprised of thirteen males and seventy females for control groups.

10ml each of the subjects` blood specimen was collected via a standard venipuncture technique after seeking their consents and approval. 5ml was dispensed into ethylene-diamine tetraacetic acid (EDTA) anticoagulated bottle for haematocrit (PCV) estimation using micro haematocrit centrifuge while the remaining 5ml was dispensed into sterile plain bottle with each blood specimen allowed to clot , carefully retracted and spun , thereafter the serum was collected and the alkaline phosphates parameter were measured quantitatively with spectrophotometer using the specified method for alkaline phosphatase (colorimetric endpoint) as previously described by (Kaplan, 1972) and modified in Teco Diagnostics, Anaheim CA 92807, U.K.

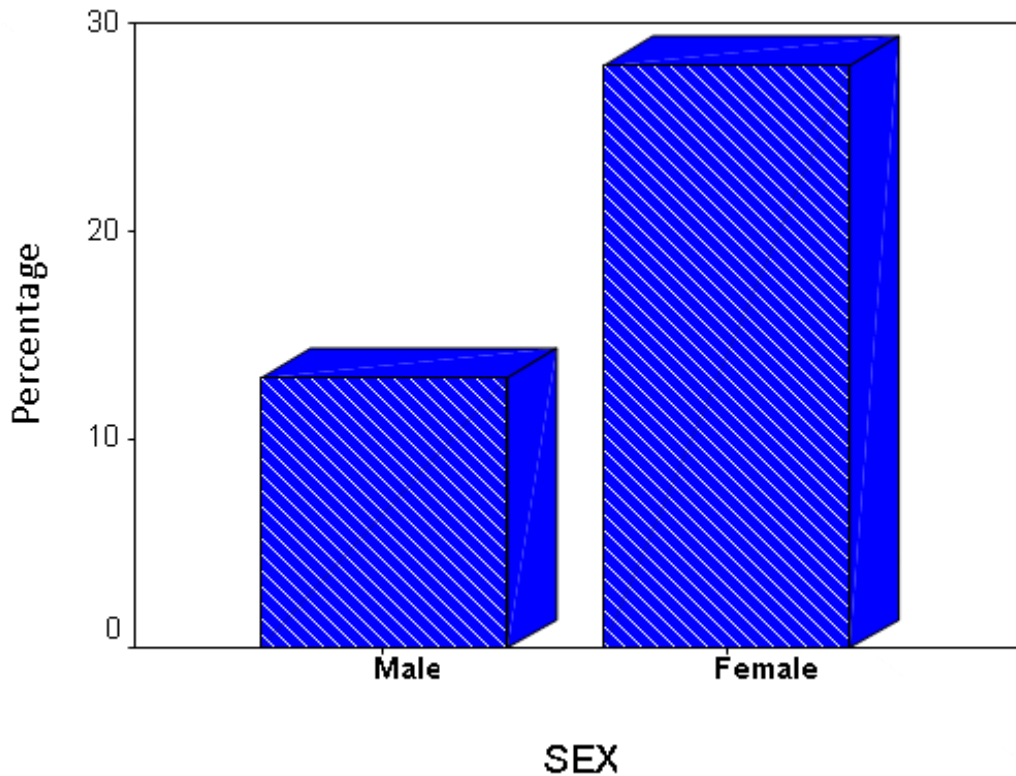
Statistical Analysis

The results were expressed as mean and standard deviation , while differences between the groups used for this study were analysis using the student`s “ t” tests . The results were considered statistically significant at $P < 0.05$.

Results and Discussion

Table (1) Distribution of patients according to their sex

Patients groups	Patients No.	Percentage
Male	13	31.7%
Femal	28	68.3%
Total	41	100%

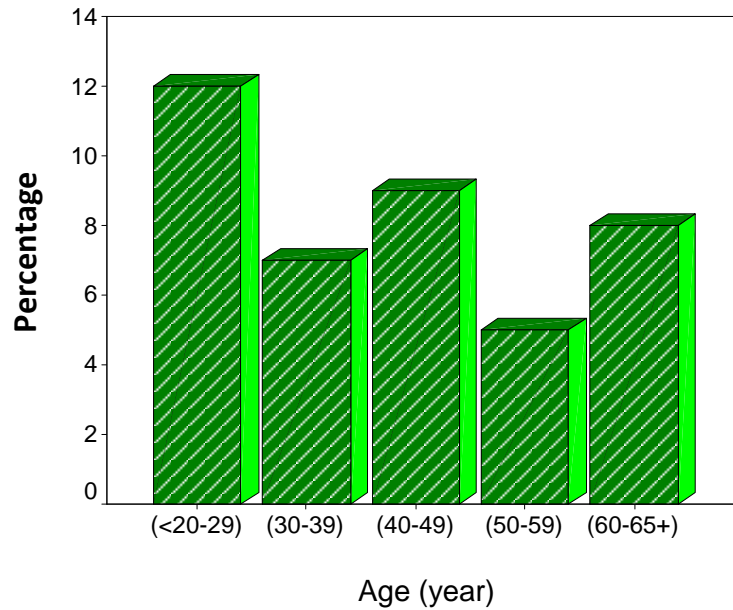


Figure(1) Distribution of patients according to their sex

Table and figure (1) revealed that the most of patients were the female [28 out of 41] [i.e 68.3%] rather than the males [13 out of 41] [i.e 31.7%]. Most studies denoted to the prevalence of polycythemia disease was among men rather than women which revealed that the male : femal is (2:1) (Prchal, 1995 ; Means , 1999) .some observed an equal ratio of males : females [1:1] (Ramnik, 2006).the explanation for these variation may be attributed to the difference in samples.

Table (2) Distribution of patients according to the age groups .

Patients groups	Patients No.	Percentage
(<20-29)	12	29.3%
(30-39)	7	17.1%
(40-49)	9	22%
(50-59)	5	12.2%
(60- 60+)	8	19.5%



Figure(2)Distribution of patients according to the age groups

Table and figure (2)revealed that the distribution of disease among age groups .according to this table, the majority of patients were at the age between (<20-29)years with percentage of (29.3%) and (40-49)years with a percentage (22.0%) while age groups between(60-69+)years were (19.5%) and age groups between (30-39)years were (17.0%) Moreover it was clear that patients between (50-59)years were(12.2%) .

The above results agreed with the observation of other studies (McGraw Hill Lange, 2008; Pearson *et al.*, 2000; Ang *et al.*, 2002).

While the current study disagreed with other studies (Gilbert, 2003; Barbui *et al.*, 2009) which observed that most polycythemia patients age groups range (40-60) years.These variation may be attributed to the different factors include :- difference in sample size , genetic factor, geographical and enviromental differences between Iraq and other countries.

Table (3):- Mean distribution of packed cell volum in the polycythemic and apparently healthy (control) subjects.

Packed cell volum	NO.	Mean±SD.	P- value
Patient groups	41	51.49±4.62	(P<0.01) Highly Significant .
Control groups	30	36.30±3.22	

Total	71	
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SD= Standard of deviation

The data from Table -3 show that there was a highly significance in packed cell volum between patient groups (51.49 ± 4.62) when compared with control groups (36.30 ± 3.22). The above result showed the packed cell volum increase in polycythemia patients which agreed with other studies which denoted that the packed cell volum increase in polycythemia vera because of uncontrol red blood cell production which is due to abnormal clone of the hematopoietic stem cell with increase sensitivity to the different growth factor for maturation (Maran & Pichal, 2004; McGraw Hill Lange, 2008).

Table (4) :- Comparison between the mean values of the alkaline phosphates parameter measured in the polycythemic and apparently healthy (control) subjects.

Alkaline phosphates	NO.	Mean \pm SD	P- value
Patient groups	41	206.46 ± 25.27	(P<0.01) Highly Significant
Control groups	30	109.90 ± 13.77	
Total	71		

SD= Standard of deviation

Alkaline phosphatase is an enzyme that induced in liver, bone and other tissues which liberates phosphate under alkaline condition. Our data observed that the mean values of serum alkaline phosphatase in the polycythemic patients were significantly higher ($P < 0.05$) than the apparently healthy (control) groups as shown in Table-4. This finding however, agrees with the previous work of (Ian & Owen, 2006; Egoro *et al.*, 2014) who reported elevated serum concentration of alkaline phosphates in polycythemic patients.

In this respect others studies (Pearson *et al.*, 2000; Ang *et al.*, 2002) revealed that the leukocyte alkaline phosphates increase in polycythemia vera which influence by indirect way on alkaline phosphates in sera of polycythemia vera. also other studies showed that Myelofibrosis occure when the normal bone marrow is replaced with scar tissue and can decrease and damage blood cell that were made in the marrow ,it also lead to increase alkaline phosphates while polycythemia vera is a disorder in which bone marrow overproduces red blood cells and increase level of alkaline phosphates (Perrotta *et al.*, 2006; Landolfi *et al.*, 1998).

Conclusion

the present study has been shown that the concentration of serum alkaline phosphatase is influenced by polycythemia. It is therefore recommended that this parameter with other biochemical parameters should be quantitatively measured in all polycythemic subjects and be reversed to normal levels upon the findings of elevated values in order to prevent any subsequent complications.

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