

Compares the effect of use some anticoagulants on the estimation of some blood parameters in human

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Abstract:

The effect of heparin, sodium citrate and ethylene-diamine-tetra-acetic acid (E.D.T.A.) on the estimation of red blood corpuscle (R.B.C), packed cell volume (P.C.V), haemoglobin level (Hb), mean corpuscular volume (M.C.V) and mean corpuscular haemoglobin concentration (M.C.H.C) have been studied using classical test method.

The E.D.T.A. and sodium citrate can produce serious errors in estimation the parameters that list above and reliable results are only obtained within heparin that is a more suitable anticoagulant for this investigation. Storage with anticoagulant for 24 hours at 15 C temperature has great influence on the results.

Introdtion:

The estimation of the red blood corpuscle (R.B.C), packed cell volume (P.C.V), haemoglobin level (Hb), are regarded as a reliable investigation in the diagnosis of anaemia and as cardinal signs for certain disease and errors in the estimation of mean corpuscular volume (M.C.V) and mean corpuscular haemoglobin concentration (M.C.H.C) are thought to be due more often to errors in the estimation of (R.B.C),haemoglobin than of the (P.C.V.)(1,2,3,4).The introduction and viability of an improved high-speedmicro-haematocrit method,visible and UV spectrophotometer , the use of the sodium citrate, salts of ethylenediamine-tetraacetic acid(E.D.T.A.)as anticoagulants has resulted in a large number of laboratories using of sodium citrate, (E.D.T.A.) as the anticoagulant for routine blood counts and the determination of the (P.C. V.). The high speed micro-haematocrit consistently yields (P.C.V.) 1-3 % lower than conventional methods and this affects the calculated(M.C.H.C.)(5,6). This effect is due to the smaller amount of trapped plasma when using this method and more complete packing of cells (7).(8) refer in routine

investigations,(M.C.H.C.) within the normal range are occasionally found in patients with proven iron deficiency anaemia and some norm chromic patients apparently have an abnormally high(M.C.H.C.).These obvious errors are disturbing and may be due to increased anticoagulant concentration, or returned to this laboratory containing less than the recommended amount of blood. Sodium citrate is known to cause distortion and shrinkage of red cells and to affect the estimation of (P.C.V.) by conventional methods while the Ethylene-diamine-tetra-acetic acid is known to cause increased destruction rate of (R.B.Cs.) specially old not aged corpuscles(9). Heparin, however, causes little alteration in corpuscular size when used as an anticoagulant (10). It is the purpose of this investigation to examine the effect of anticoagulants and storage in estimation of the red blood corpuscle (R.B.C), packed cell volume (P.C.V), haemoglobin level (Hb), mean corpuscular volume (M.C.V) and mean corpuscular haemoglobin concentration (M.C.H.C.) by haemocyto meter, high-speed micro-haematocrit method and viable spectrophotometer.

Material and methods:

All the samples were assemble from young men in five

days each day three samples at volume 15cc blood divided in three tube, one tube contain heparin 100U/5cc blood (stander tube), second tube contain sodium citrate 0.2% of from blood assemble as used in laboratories and third tube contain EDTA 5mg/5cc blood as it used in laboratories (The samples tubes were filled directly from the syringe, immediately before coagulation had taken place); to determined the (R.B.Cs.) count by used haemocytometer method .drabkin's solution to haemoglobin and hematocrite to packed cell volume; while (M.C.V) and (M.C.V.C.) were estimated by use calculated according to the conventional formula (11,12,13,14). The sample was examine at once assemble and again after 24 hours at temperature keeping 15 C .The results were statistically analysis by t-test(15).

Results:

The results that obtained from estimations of (R.B.Cs.) count; haemoglobin level;(P.C.V.); and(M.C.H.C.)as a mean value show and fixed cardinal significant differences($P < 0.05$)among three type of anticoagulant that used in this investigation (table I, II,.in,V).Also The results show and fixed no significant differences ($P > 0.05$)among three type of anticoagulant that used in this investigation in

(M.C.V.)test (table IV). The results that obtained showed significant differences ($P<0.05$) between heparin and sodium citrate and (E.D.T.A) in estimations of(R.B.Cs.)count ; haemoglobin level; (P.C.V.); and (M.C.H.C.) at once and after 24h from keeping at 15C ;while there is no significant differences($P>0.05$) in estimation of this parameters at once or after 24h when heparin was used as anticoagulant.

Discussion:

The measurement of(R.B.Cs) and(P.C.V) rather than haemoglobin level dependent on the number, size .density of the cell, contain of haemoglobin pigment , the force applied, the time of spinning, difference in density of cell and plasma medium and viscosity of the medium

(16,17,18,19). We believe that these changes in R.B.Cs count are due to red corpuscle shrinkage and distortion in shape as this change is easily observed in stained films of these samples, whether this change is due to osmosis or a 'toxic' effect on the red corpuscle envelope has not been determined ;this believed was agreement with (8,9) that suggest the sodium citrate is known to cause distortion and shrinkage of red cells and to affect the estimation of (P.C.V.) by conventional methods while the Ethylene-diamine-tetra-acetic acid is known to cause increased destruction rate of(R.B.Cs) specially old not aged corpuscles.' the anticoagulant, force, time of spin, and haematocrit tube are standardized the method gives a consistent estimate of the volume of packed cells' (20);The micro-haematocrit is a reliable method of estimating packed cell volume with complete packing in a short time even at low speeds (21).The method used in our.

experiments was standardized in each particular except for the anticoagulant and its concentration differences in the length of the blood column had explained the effect of anticoagulant types on estimation of blood parameter such as(P.C.V.) and this effect may be due to the toxicity and

increased (R.B.Cs) ruptures as a result of osmolarity changes (22). While the use of heparin as anticoagulant had no effect on the (R.B.C.); (P.C.V.) and haemoglobin level therefore heparin would appear to be a superior anticoagulant to sodium citrate and (E.D.T.A) and for the accurate measurement of (M.C.V.), and (M.C.H.C.) because this test depended on estimation results of (R.B.C.); (P.C.V.) and haemoglobin level and should be used for the purposes of standardization. Sodium citrate and ethylenediamine-tetra-acetic acid, is, however, a more useful anticoagulant when the other cellular constituents (white cells and platelets) have to be examined, and is therefore more suitable for routine diagnostic use. It is important to refer that the anticoagulant type such as sodium citrate and (E.D.T.A) gives critical estimation to some blood parameters when the blood storage even in suitable condition.

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مقارنة تأثير استخدام بعض مضادات التخثر على حساب بعض معايير الدم في الإنسان

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الخلاصة: تأثير الهيبارين ,سترات الصوديوم وحامض الاتلين الأمين رباعي ألكليك على حساب كريات الدم الحمر ,حجم الخلايا المرصوفة ,مستوى خضاب الدم ,معدل حجم الكرية ومعدل تركيز خضاب الدم في الكرية تم دراستها باستخدام طرق الاختبار التقليدية. حامض الاتلين الأمين رباعي ألكليك و سترات الصوديوم المستخدمة كموانع للتخثر نتج

عنها أخطاء خطيرة أثناء حساب المقاييس التي ذكرت أعلاه, ونتائج حقيقية تم الحصول عليها فقط باستخدام الهيدارين الذي يعتبر أكثر مادة ملائمة كمانع للتخثر. حفظ الدم مع موانع التخثر بعد 24 ساعة بدرجة حرارة 15م كانت لها تأثير كبير على نتائج الفحص في هذه الدراسة.