



Assessment of Serum Uric acid and Albumin among Sudanese Patients with Deep Venous Thrombosis

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Abstract

Deep venous thrombosis (DVT) is a widespread medical trouble; the incidence that was estimated is 1-2 per 1000 person-years. Is related with elevated mortality in several thrombotic disorders, increased serum uric acid level and decreased albumin are a modest marker of increased DVT risk.

This study conducted to assess the serum uric acid, and albumin in DVT patients.

This is across- sectional study based on 50 DVT patients as cases, and 50 apparently healthy individuals as controls (age and gender were matched between two groups). The serum albumin and uric acid concentration was measured using Bio-system BTS-400 spectrophotometer. Platelets count performed using Sysmex cell counter. The data obtained was analyzed using statistical packaged for social science computer program (SPSS version 20).

The level of albumin was significantly increased in DVT patients compared to control group (p -value = 0.000), while serum uric acid level was insignificantly different in both study groups (p -value = 0.929). According to gender, serum uric acid was insignificant different (p -value = 0.070), while albumin was significantly higher in female than male (p -value = 0.013). There was significant decreased in platelets count in patients compared to control group (p -value = 0.000). The mean of APTT and PT were significantly prolonged in patients than control group (P -value = 0.000) (P -value = 0.001). In concerning to correlation, there were significant negative correlation between serum albumin, uric acid levels and ages of patients (r = -0.334, p -value = 0.018) (r = -0.339 and p -value = 0.016), respectively. There was no correlation between albumin, uric acid levels and duration of disease (r = -0.026, p -value = 0.858). (r = -0.018 and p -value = 0.903), respectively.

The results of this study concluded that, serum albumin level is increased in patients with thrombosis and there was negative correlation between albumin, uric acid and ages of patients., and the platelet count is decreased.

Keywords: Hyperalbuminemia, Pulmonary embolism, platelet adhesiveness.

المستخلص :

يعتبر تخثر الوريد العميق من الحالات الواسعة الانتشار حيث قدر تأثيره بحوالي 100000 مريض سنويا بالولايات المتحدة , وقد وجد انه يصاحب ازدياد عدد الوفيات في بعض امراض التخثر المختلفه .

تهدف هذه الدراسة لتقييم مستوى حمض اليورك وسيرم الالبومين في مرضي تخثر الوريد العميق .

أجريت هذه الدراسة في 50 مريض بتخثر الدم العميق و50 متطوع من الأصحاء كعينات ضابطة واخذت عينة الدم من كل الافراد لتحضير مصل الدم وتم قياس حمض اليورك والالبومين باستخدام جهاز البايوسيسم -400 وتم تحليل البيانات إحصائيا باستخدام برنامج (اس بي اس اس اصدار 20) .

أوضحت النتائج أن 70% من المرضي في مدي عمري بين (20-40) سنة و 24% بين (41-60) سنة و 6% بين (61-80) سنة . 80% من المرضي اناث و 20% ذكور . مستويات الالبومينزادت , بينما لا يوجد فرق معنوي في مستوى سيرمحمض اليورك في المرضي مقارنة مع المتطوعين الأصحاء مع قيمة " . المتوسط \pm الانحراف المعياري للمرضى مقارنة بمجموعة التحكم " . بالنسبة للالبومين : الاحتمال الاحصائي للمقارنة (0.000). لحمض اليورك الاحتمال الاحصائي للمقارنة 0.929 . أوضحت الدراسة انخفاضاً في عدد الصفائح الدموية في المرضي المصابين بالجلطات الوريدية ($P = 0.000$). متوسط زمن الثرومبولاستين المنشط جزئياً و فارق زمن البروثرومبين أطول فتره زمنيه عند المرضي مقارنة بمجموعة الاصحاء ($P = 0.000$) ($P = 0.001$) .

اعتمادا علاقه بين العمر وكل من الالبومين و سيرم اليورك اسيد كانت ضعيفه وذات دلالة معنويه (معامل بيرسون للإرتباط = -0,334 ومستوى المعنوية = 0,018 ومعامل بيرسون للإرتباط = -0,339 ومستوى المعنوية = 0,016) علي التوالي . أيضا لم توجد علاقه واضحه بين فترة الاصابه بالمرض وكل من الالبومين وسيرم اليورك اسيد (معامل بيرسون للإرتباط = -0,026 ومستوى المعنوية = 0,858 ومعامل بيرسون للإرتباط = -0,018 ومستوى المعنوية = 0,903) علي التوالي .

خلصت الدراسة الي ان مستويات الالبومين تزيد مع مرضي تخثر الدم وكذلك مع الاناث اكثر من الذكور . واخيرا وجدت علاقه عكسيه بين الالبومين ومصل حمض اليورك باخذ العمر في الاعتبار .

Introduction

DVT is a widespread medical trouble with a predictable incidence of 1-2 per 1000 person / years. High mortality rates of 11-30% are observed in Patients with. Venous Pulmonary embolism is the main cause of death (Folsom *et al.*, 2010).

Oxygenation of LDL-C is stimulated by elevation of uric acid levels, also high level of uric acid promote lipid per oxidation and vascular smooth cell proliferation, and decrease vascular nitric oxide formation. Moreover, increased platelet adhesiveness predisposing to thrombus formation may be associated with high uric acid level (Bonner *et al.*, 2014).

Several studies reported that low serum albumin (Hypoalbuminemia) is an acute phase reactant which may reflect inflammation, which in sometimes mainly related to venous pulmonary embolism (VTE) (Burtis *et al.*, 2012). Decrease in serum albumin may reflect renal loss of albumin and anti-thrombotic agents and this is the hypercoagulable state which appear in the nephrotic syndrome, while in some cases low serum albumin considered as direct cause of VTE, but not a risk marker (Königsbrügge *et al.*, 2016). Also Hypoalbuminemia considered as one of the most causes of DVT (Thomas *et al.*, 2009). Several studies described the link between albumin and long-term risk of VTE (Folsom *et al.*

2010; Olson *et al.*, 2014; Konigsbrugge *et al.*, 2016). Low serum albumin level particularly 2.8 g/dl, is the most significant independent predictor of venous thrombotic risk (Lionaki *etal.*, 2012).

Stimulating vascular smooth muscle cell production and the serum albumin levels less than 2.0 to 2.5 g per dL appear to confer an elevated risk of DVT. High uric acid level could be a consider as independent risk factor for VTE; however, there are few published reports on the relationship between gout attack and VTE (Yamada *et al.*, 2010). Also elevated serum uric acid levels may help in micro vascular diseases, Therefore, elevated levels of serum uric acid and albumin are positively associated with VTE (Jung *etal.*,2010; Martín *etal.*,2011). Low level of uric acid is associated with deleterious effects on endothelial dysfunction, oxidative metabolism, platelet adhesiveness, and aggregation. The atherosclerotic plaque contains a considerable amount of uric acid which may increase platelet adhesiveness and potentiate thrombus formation (Jung *et al.*, 2010). According to that this study aimed to assess serum uric acid and albumin among Sudanese patients with DVT.

Materials and Methods:

Study design: This is across-sectional study.

Study area: the study was carried out in Sudanese patients with DVT in Omdurman Educational Hospital, Khartoum state, Sudan.

Study period:

The study was carried out in the period from February to May 2019.

Ethical consideration:

This study was approved by scientific committee of Clinical Chemistry Department of Sudan University of Science and Technology, an informed consent was obtained from each participant. The clinical data were obtained and recorded on questionnaire sheet.

Study population and samples size:

The study included 50 patients with DVT, their age range between 20 -80 years and 50

healthy individuals as control age range between 20 -80 years.

Inclusion criteria: Sudanese patients with DVT and healthy individuals serve as control were included in this study.

Exclusion criteria:

Patients having any disease or disorder that may affect parameters under investigation were excluded.

Sample collection:

Four millilitres of blood was collected by standard vein puncture technique. Two ml directly poured to test tube and centrifuged and the serum was obtained, and 2 ml was collected in EDTA containers for platelets count.

Methods:

Estimation of serum uric acid and albumin concentrations; serum uric acid and albumin concentrations were measured using Biosystem BTS-400 spectrophotometer.

Platelets count: Platelets count performed using Sysmex cell counter. The principle was based on electrical impedance method; in which whole blood is passed between two electrodes through an aperture so narrow that only one cell can pass through at a time. The impedance changes as a cell passes through. The change in impedance is proportional to cell volume, resulting in a cell count and measure of volume (Keohane *etal.*, 2016) .

Quality control: Pathological and normal control sera were used to assure the accuracy and validity of results.

Data analysis:

Collected data were analyzed by a computer system using statistical package for social sciences (SPSS) .T test and Pearson's correlation test were used for comparison and correlation.

. *P- Value* less than 0.05 considered significant

Results:

70% of patients between (20-40) years, (24%) between (41-60) years and (6%) between (61-80) years. (20%) of patients were males while (80%) were females as in table (1).

Table (1) : Age and gender distribution in case group.

Variable	Number	Percentage
Age 20-40	35	70%
Age 41-60	12	24%
Age 61-80	03	6%
Sex male	10	20%
Sex female	40	80%

The level of serum albumin was significantly increased in patients with DVT, while there was insignificant different in serum uric acid level in patients compared

to control group (4.1 ± 0.65 versus 3.5 ± 0.49 , P -value 0.000) (3.85 ± 1.8 versus 3.88 ± 1.2 , P -value 0.929) respectively as in table(2),

Table (2): Mean of albumin and uric acid levels in case and control group.

Variable	Case N=50 Mean \pm SD	Control N=50 Mean \pm SD	p. value
Albumin(g/dl)	4.1 ± 0.65	3.5 ± 0.49	0.000
Uric acid mg/dl	3.85 ± 1.8	3.88 ± 1.2	0.929

Result given in mean \pm SD, P . value ≤ 0.05 consider significant.

(4.2 ± 0.63 versus 3.6 ± 0.55 , P -value 0.013), while there was insignificant difference in the mean of uric acid according to gender (2.9 ± 1.65 versus 3.05 ± 1.85 P -value 0.070) as in table (3).

Independent sample T test was used for comparison.

According to gender, there was significantly increased albumin level in female than male

Table (3): Mean of uric acid and albumin levels in patients according to gender.

Variable	Male N=10 Mean \pm SD	Female N=40 Mean \pm SD	p.value
Albumin (g/dl)	3.6 ± 0.55	4.2 ± 0.63	0.010
Uric acid mg/dl	2.9 ± 1.65	3.05 ± 1.85	0.070

Result given in mean \pm SD, P . value > 0.05 consider insignificant.

was 36.79 seconds in patient group and 31.64 seconds in control group. The difference was statistically significant (P -value= 0.000).

Independent sample T test was used for comparison.

There was low platelets count in the patient group, the mean platelets count was $256 \times 10^9/L$ in patient group while it was $331.4 \times 10^9/L$ in the control group. The mean of Anti partial thromboplastin time (APTT)

The difference of prothrombin time (PT) was statistically significant (P -value 0.001). The mean of PT was 13.58 seconds in patient group and 12.78 seconds for the control group, as in table (4)

Table (4) Mean of platelets count, prothrombin time (PT) and Anti partial thromboplastin time (APTT)

	Group	N	Mean	P-value
Platelet count /L	Case	100	256x10 ⁹	.0000
	control	50	331.4x10 ⁹	
PT in seconds	Case	100	13.58	.0010
	control	50	12.61	
APTT in seconds	Case	100	36.78	.0000
	control	50	31.64	

The results showed that, there were negative correlation between albumin, uric acid and ages of patients ($r = -0.334$, p - value=0.018) ($r = -0.339$ and p - value=0.016), respectively (figure 1.2). There were no correlation between albumin, uric acid levels and duration of disease $r = -0.026$, p -value=0.858). ($r = -0.018$ and p - value=0.903) respectively as in figures (3,4).

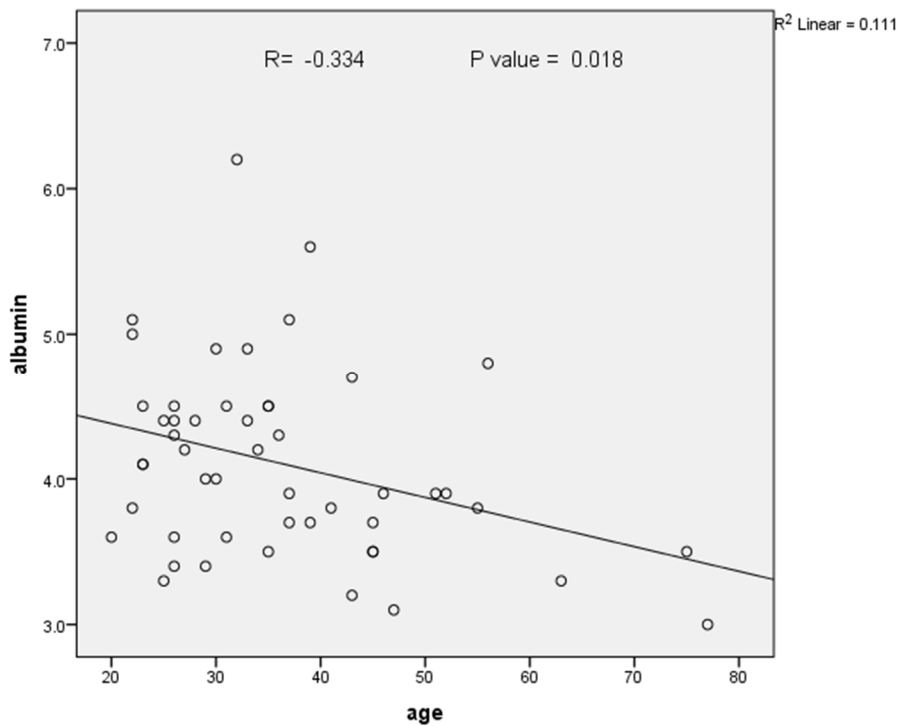


Figure (1): Correlation between albumin concentrations and age in case group

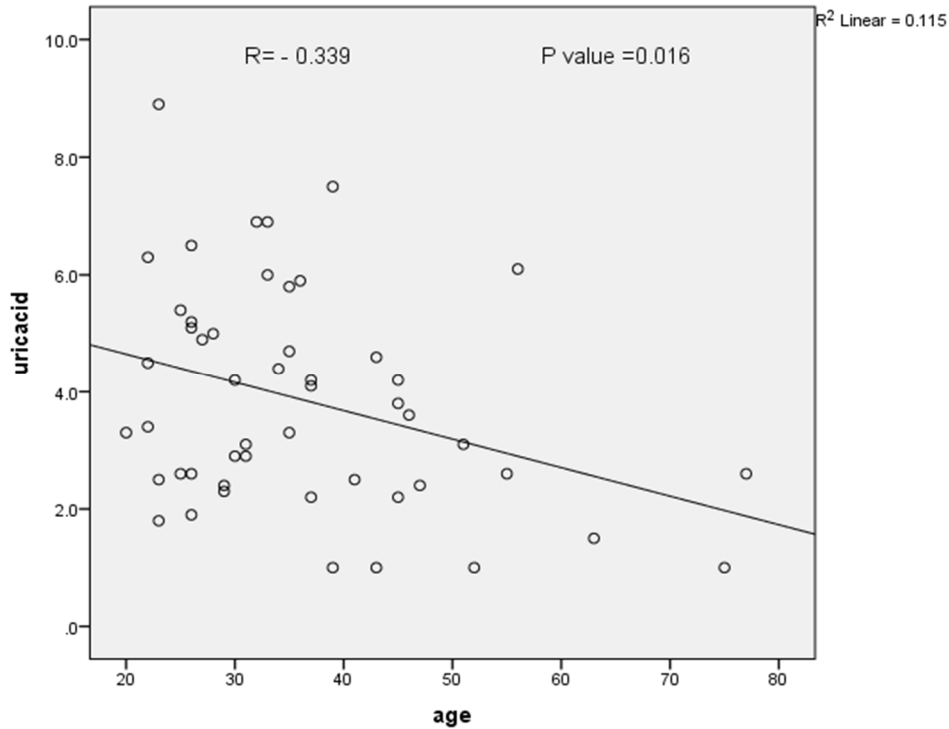


Figure (2): Correlation between serum uric acid concentrations and age in case group.

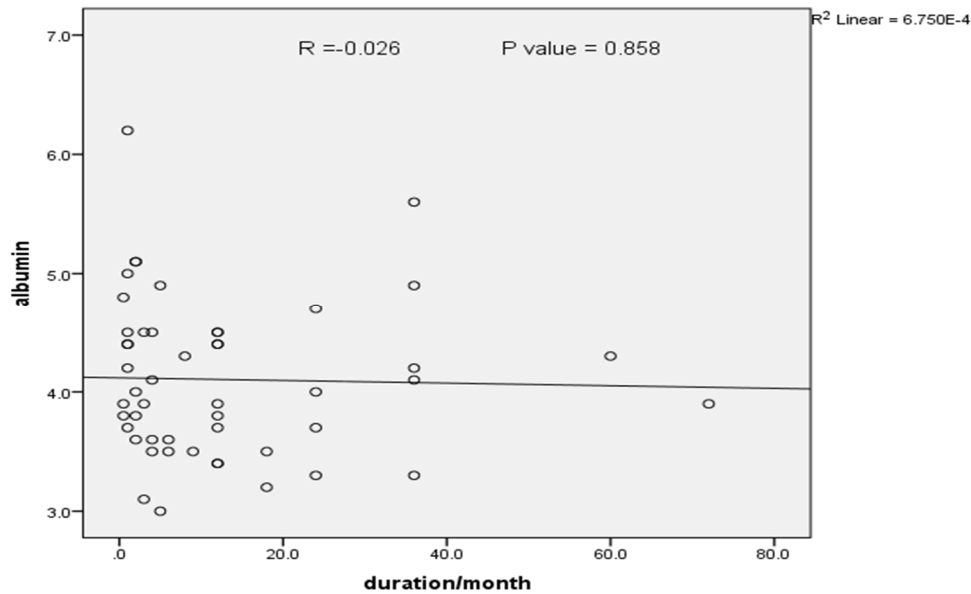


Figure (3): Correlation between albumin concentrations and duration of disease/month in DVT patients.

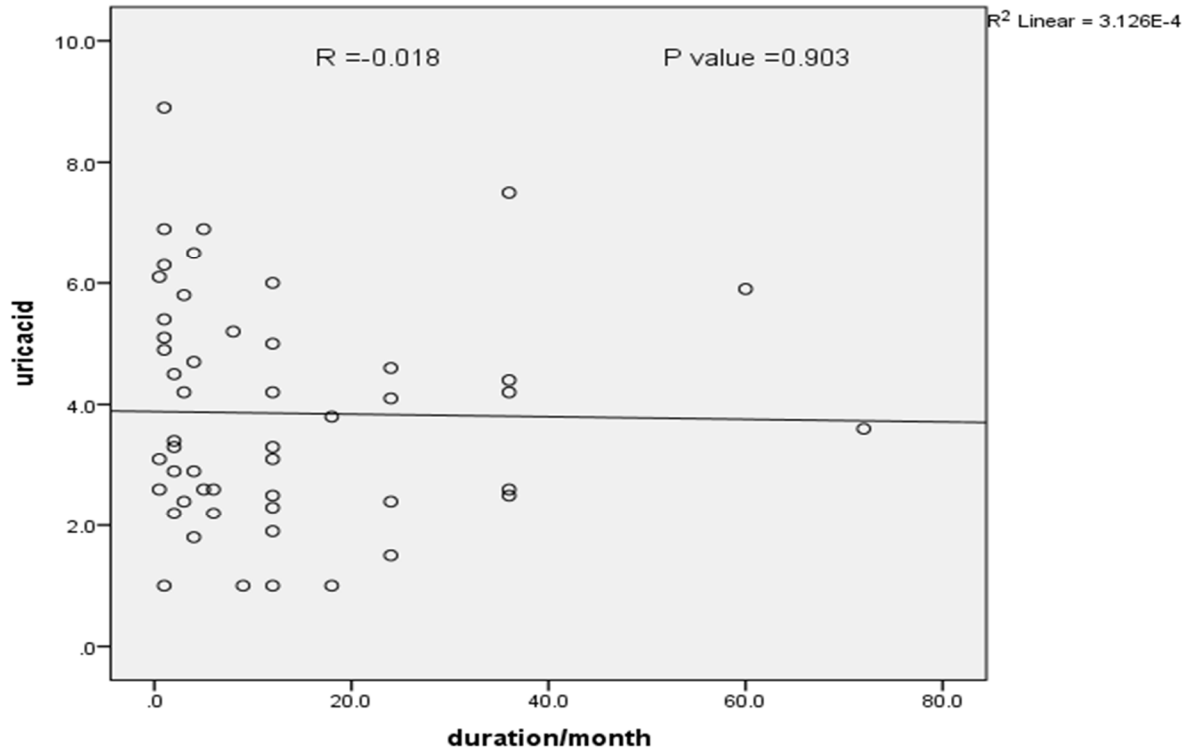


Figure (4): Correlation between serum uric acid concentrations and duration of disease/month in DVT patients.

Discussion:

Result of this study showed that, the frequency of DVT was higher in females subjects than males, similar frequency reported by another study (Tracy *et al.*, 2008).

The result of the present study showed that, the level of albumin was significantly increased in DVT patients compared to control group with *P-value* (0.000), this result agreed with another study, which reported that, serum albumin was significantly elevated in DVT patients compared to control group (Idicula *et al.*, 2009). These may be due to serum albumin is an acute phase reactant which may reflect inflammation, which in sometimes mainly related to venous pulmonary embolism (VTE) (Burtis *et al.*, 2012). This result disagree with another study, which reported; decrease serum albumin level may reflect renal loss of albumin and anti-thrombotic agents and this

is the hypercoagulable state which appear in the nephrotic syndrome, while in some cases low serum albumin considered as direct cause of VTE, but not a risk marker (Königsbrügge *et al.*, 2016).

Result of this study showed insignificant difference in serum uric acid level in cases compared to control group, *P-value* (0.929). This result disagreed with previous study which reported that, serum uric acid was significantly increased in patients with DVT compared to control group. The atherosclerotic plaque contains a considerable amount of uric acid which may increase platelet adhesiveness and potentiate thrombus formation (Wilbur and Shian, 2012) and also disagree with other study which showed that elevated serum uric acid was associated with an increased risk of VTE, suggesting that serum uric acid might be a novel risk factor or marker for VTE (Kubota *et al.*, 2016).

The current study showed that, there was insignificant difference in serum uric acid according to gender (P -value = 0.070). This result disagreed with previous study, which found that serum uric acid was significantly higher in females when compared to the males in patients with thrombotic complications (Chaudhary *et al.*, 2013). Albumin was significantly higher in female than male with P -value (0.013), this result disagreed with another previous study, which found that albumin was significantly lower in female than male groups (Chaudhary *et al.*, 2013).

There was statistically significant decreased in platelets count in DVT patients compared to control group (P = 0.000). These findings are supported by Habib *et al.*, 2012 who found a significant decrease in platelets count among DVT patients when compared to healthy individuals (P -value <0.001) (Habib *et al.*, 2012). Monreal *et al.*, 1991 confirmed the reduction in platelets count in patients with Pulmonary Embolism (P -value<0.008), but not in DVT.. The mean of Anti partial thromboplastin time and prothrombin time were significantly prolonged in patients than control group (P – value = 0.000) (P – value = 0.001). This results are incompatible with the results observed by (Garg. 2009) who found low Anti partial thromboplastin time in postoperative thrombophilic patients. (Garg, 2009) . It is well known that the Anti partial thromboplastin time is affected directly by heparin and to some extent by warfarin. Because of that we believe the Anti partial thromboplastin time is prolonged in this study group, since the majority of patient receiving heparin or warfarin.

(Garg *et al.*, 2009) described that the mean of prothrombin time decreased in postoperative individuals, indicating hypercoagulable state although the change was insignificant (P =0.06) (Garg *et al.*, 2009). It is assumed that the increment of

prothrombin time in this study is mainly due to the anticoagulant therapy. In regards to correlation, the correlation between albumin, serum uric acid and age was significant negative correlation with (r = - 0.334, p 0.018 and r =-0.339, p 0.016) respectively, this result disagreed with study carried out by many authors, who found positive correlation between the albumin, serum uric acid and age (Weaving *et al.*, 2016; Umara *et al.*, 2018).

There was no correlation between albumin, serum uric acid and duration of disease, this result similar to another result, which reported that, there was no correlation between albumin, serum uric acid and duration of disease (Jung *et al.*, 2010; Lionaki *et al.*, 2012) .

Conclusion:

This study concluded that, albumin is increased in patients with DVT and there were negative correlation between serum albumin, uric acid levels and ages of patients. The platelets count is decreased in patient with DVT. The serum concentrations of the uric acid and albumin must be done routinely for DVT patients.

To improving of Disease monitoring should be recommended by proteins supplement regulation.

Other biochemical parameters must be considered such as lipid profile. In addition to Doppler ultra sonography, MRI and D dimmer.

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