

Assessment of Serum Triglyceride and High Density Lipoprotein Cholesterol among Sudanese Patients with Deep Venous Thrombosis

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Abstract

Background: Deep Vein Thrombosis (DVT) and Vein Thrombo Embolism (VTE) are a major health problem with high mortality worldwide. Dyslipidemia are used as a marker of increased DVT risk.

Objectives: This study aimed to assess serum triglyceride (TG), High Density Lipoprotein cholesterol (HDL-C) levels among Sudanese DVT patients.

Methods: This was case control study conducted in Omdurman Teaching Hospital in Khartoum State during period between February to May 2019, total of 100 Sudanese patients with DVT were enrolled in the study, including 50 DVT patients and 50 apparently healthy individuals as controls matching in age and gender.

Serum TG and HDL-C were measured by ROCHE DIAGNOSTIC – COBAS INTEGRA400 PLUS. Data were analyzed using Statistical Package of Social Science (SPSS version 20).

Results: The result showed, thrombosis most common among age between (20-40) years (70%), (24%) between (41-60) years and (6%) between (61-80) years. (80%) of patients were females, while (20%) were males. TG level increased (164 ± 31 mg/dl versus 88 ± 18.8 mg/dl, *P. value* = 0.00) while HDL-C decreased (16.2 ± 6.5 mg/dl versus 50 ± 7.7 mg/dl, *P. value* = 0.00) in cases compared to control group. There were insignificant differences in the mean of TG and HDL-C according to gender: TG (176 ± 31.8 mg/dl versus 161 ± 30.4 mg/dl, *P. value* 0.15), HDL.C (14 ± 6.6 mg/dl versus 17 ± 6.5 mg/dl, *P. value* 0.26). TG level increased in patients who take warfarin treatment compared to patients who take heparin (171 ± 31.7 mg/dl versus 161 ± 30.9 mg/dl, *P. value* (0.00) and there was no difference in level HDL- C (12 ± 3.8 mg/dl versus 18 ± 6.5 mg/dl, *P. value* 0.34). Results also showed that there were no correlation between TG, HDL-C and ages of patients ($r = 0.09$, *p. value* = 0.5) ($r = -0.25$, *p. value* = 0.08) respectively.

Conclusion: This study concluded that the level of TG is increased, while HDL- C is decreased in DVT patients; this indicates that these parameters are a promising novel biomarker for predicting treatment outcome in patients with thrombosis.

Key words: DVT, TG, HDL-C.

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Introduction: Thrombosis is the formation of embolus ⁽¹⁾.

blood clot inside a blood vessel, obstructing the flow of the blood through the circulatory system, blood clots may form in the body under certain conditions, clot or apiece of clot, that breaks free and begin to travel around the body is known as an Annual incidence rates ofDeep vein thrombosis (DVT) ranged from ~45 to 117 in 100,000 adults per year ⁽²⁾.Triglyceride (TG) is one of most important lipids in the body, containing three fatty acid molecules attached to one molecule of

glycerol linked by ester bond in one of three stereochemically distinct bonding position referred as sn-1, sn-2 and sn-3, measurement of TG useful in evaluation of cardiovascular (CV) risk has long been associated with multiple issues ⁽³⁾. High Density Lipoprotein cholesterol (HDL-C) is one of the five major groups Lipoproteins. HDL-C correlates with cardiovascular risk. Low HDL-C should prompt examination of additional metabolic and inflammatory pathologies. An increase in HDL.C through lifestyle change has positive effects and recommended ⁽²⁾. Relationship between lipid levels and risk of venous thrombosis is not well established; several studies in the past decade have shown that patient with venous thrombosis (Deep vein thrombosis) have an increased of subsequent arterial disease ⁽⁴⁾. Lipid levels can be modulated by life style intervention and drug therapy.

Serum HDL-C concentration is reduced in patients with thrombosis while serum TG concentration is increased ⁽³⁾. Higher levels of serum TG and low level of HDL-C were associated with postoperative DVT after total Heparin arthroplasty in patients with non-traumatic osteonecrosis of the femoral head. Serum HDL-C concentration is reduced in patient with thrombosis while serum TG concentration is increased ⁽⁵⁾. High serum HDL-C level was associated with decreased risk of venous thrombosis after adjustment in hospitalization, malignancy, height and weight. In contrast elevated TG level were associated with an increase risk ⁽⁵⁾.

Material and Methods: This was comparative case control hospital base study, carried out in Sudanese patients with DVT in Omdurman

Educational Hospital in Khartoum state during February to May 2019. Total of 100 Sudanese patients with DVT were enrolled in the study; 50 patients with DVT, aged range between 20 -80 years as case group and 50 apparently healthy individuals as controls matching in age and gender.

Ethical consideration: This study was approved by scientific committee of college of medical laboratory science, Sudan University of Science and Technology, ethical committee No (SCI -01 – 19), Verbal informed consent was obtained from each participant.

Data and sample collection: Clinical data were obtained and recorded on questionnaire sheet. Four ml blood was collected by standard venipuncture method, directly in plain container and the serum was separated after centrifugation for 5 minutes at 5000 rpm at room temperature. Estimation of triglyceride and HDL-C concentrations using full automated ROCHE DIAGNOSTIC – COBAS INTEGRA400 PLUS. Pathological and normal control sera were used to assure the accuracy of the results.

Data analysis: Collected data were analyzed by a computer system using statistical package for social sciences (SPSS version 20), T test and person correlate were used for comparison and correlation.

Results: 70% of patients aged between 20-40 years, 24% between 41-60 years and 6% between 61-80 years. 20% of patients were males while females represent 80% as in table (1). The level of TG increased and HDL.C decreased in DVT patients compared to control group: TG (164 ± 31 mg/dl versus 88 ± 18.8 mg/dl, P .value =0.00), HDL.C (16.2 ± 6.5 mg/dl versus 50 ± 7.7 mg/dl, P .

value =0.00) as shown in table (2). There were insignificant differences in the mean of TG, HDL - C levels according to gender: TG (176 ± 31.8 mg/dl versus 161 ± 30.4 mg/dl, P. value 0.15), HDL.C (14 ± 6.6 mg/dl versus 17 ± 6.5 mg/dl, P. value= 0.26) as in table (3). Level of TG increased in patients who take warfarin treatment compared to patients who take heparin, there was no significant difference in the level of HDL - C; (171 ± 31.7 mg/dl versus 161 ± 30.9 mg/dl, P. value =0.00) for TG (12 ± 3.8 mg/dl versus 18 ± 6.5 mg/dl, P. value = 0.34) for HDL- C as in table (4). The results showed that, there were no correlations between TG, HDL-C and ages of patients ($r = 0.09$, p .value =0.51) ($r = -0.25$, p. value =0.08) as in figure (1 and 2).

Table 1: Gender and age distributions among 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%

Table (2): Comparison of mean levels of TG and HDL-C in case and control group.

Variable	Case: N=50 Mean $\pm$ SD	Control: N=50 Mean $\pm$ SD	p. value
TG mg/dl	164 $\pm$ 31	88 $\pm$ 18.8	0.000
HDL – C mg/dl	16.2 $\pm$ 6.5	50 $\pm$ 7.7	0.000

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

Independent sample T test was used for comparison.

Table 3: Comparison of TG and HDL – C levels in patients according to gender.

Variable	Male: N=10 (Mean $\pm$ SD)	Female: N=40 (Mean $\pm$ SD)	p.value
TG	176 $\pm$ 31.8	161 $\pm$ 30.4	0.15
HDL - C	14 $\pm$ 6.6	17 $\pm$ 6.5	0.26

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

Independent sample T test was used for comparison.

Table 4: Comparison between Heparin and Warfarin in case group.

Variable	Warfarin: N=12 (Mean $\pm$ SD)	Heparin: N=38 (Mean $\pm$ SD)	p.value
TG	171 $\pm$ 31.7	161 $\pm$ 30.9	0.00
HDL.C	12 $\pm$ 3.8	18 $\pm$ 6.5	0.34

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

Independent sample T test was used for comparison.

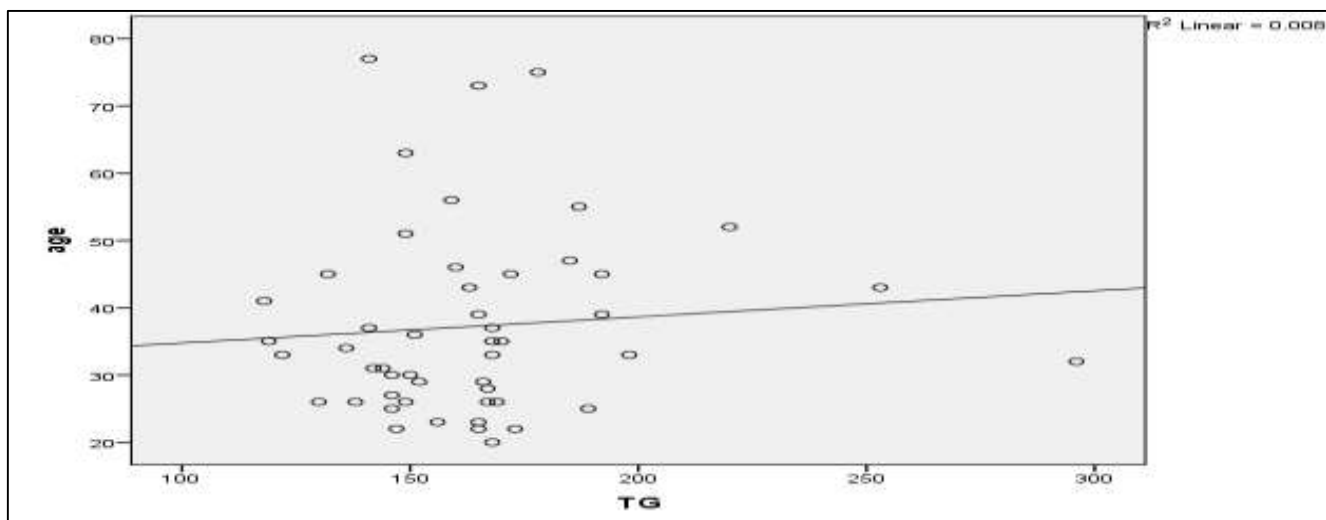


Figure1: Correlation between TG level and age in case group
($r = 0.09$, p . value =0.5).

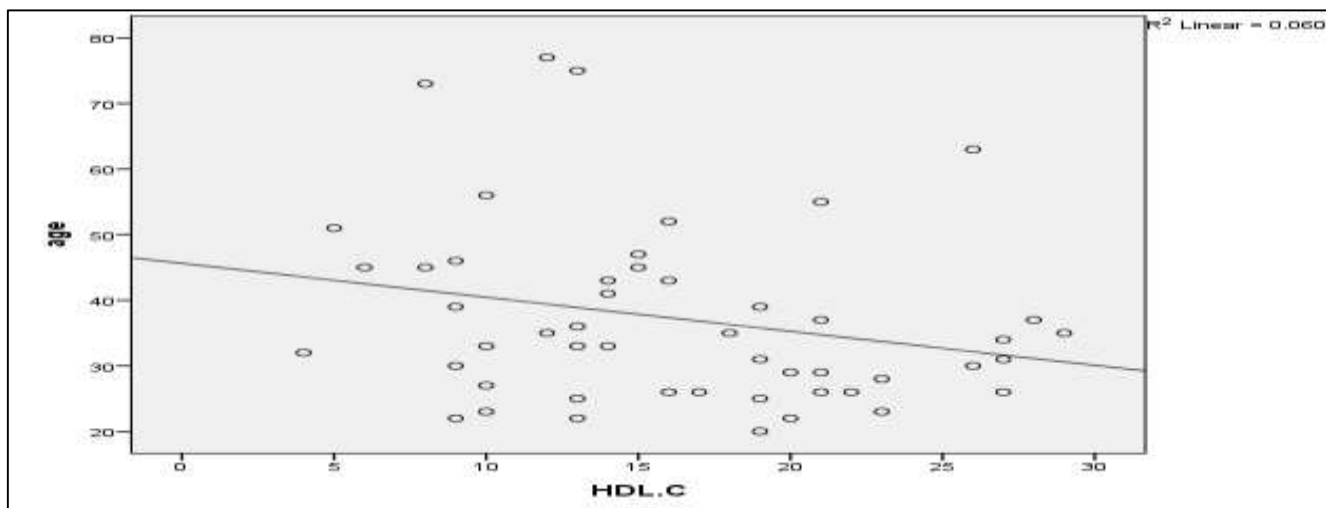


Figure 2: Correlation between HDL - C level and age in case group
($r = - 0.25$, p . value =0.08).

Discussion: Thrombosis is the formation of blood clot inside a blood vessel, lead to obstructing the flow of the blood through the circulatory system⁽²⁾. In current study DVT most common among age between 20-40 years; this is agreed with study carried by Morelli *et al.*,⁽⁹⁾. Also this study found 80% of patients were females, while 20% were males. Similar frequency reported in previous study conducted by Silverstein *et al.*,⁽¹⁰⁾ and also agree with previous studies found that females had a higher risk of DVT than males^(13,14). Also

similar finding reported in meta-analysis in 2018 found that women were in risk to develop distal DVT than men. The result of this study showed, there was significant increase in triglyceride level and decreased HDL- C level in thrombosis patients compared to control group (P .value = 0.000), this agreed with study showed that serum TG level increased and HDL-C decreased, the occurrence of this case in thrombosis patients due to the role of TG-rich lipoproteins in signaling mechanisms via

apolipoprotein C-111 and free fatty acids leading to activation of NF κ B, VCAM-1 and other inflammatory mediators which lead to fatty streak formation and advanced atherosclerosis and hypertriglyceridaemia can lead to change in gene expression in endothelium producing to a prothrombotic state⁽⁶⁾. Also this study showed insignificant difference in the mean of TG and HDL-C in males compared to females (P . value = 0.15) and (P . value = 0.26) respectively; this finding similar to another result which reported there were no significant difference in the mean of HDL-C and TG in males compared to females⁽¹⁰⁾ and disagree with previous studies which suggest HDL-C distribution differed by ethnicity and gender^(15,16,17); and the study done Davis et al. report that sex difference in HDL-C level of six countries and assessed that female had higher HDL-C level than male⁽¹⁶⁾. Another study carried out by Akemet *al* suggested that prevalence of low HDL-C of was 22.4 %, distributed into 32.8% in males and 12.5% in females⁽¹⁸⁾.

This study also showed that TG level increased in patients who take warfarin treatment compared to patients who take heparin treatment (P . value =0.00). warfarin act as enzyme inhibitor called vitamin K epoxide reductase which lead to lack of fibrin and so on improve the functioning of blood circulating so best lipid metabolism⁽¹¹⁾. Also previous study Noted that treatment of warfarin has an effect on the adjustment of cholesterol levels compared to normal rates and levels of cholesterol, LDL are decreasing well compared to rates of TG where rates decrease after treatment, but stay slightly higher than normal rates⁽¹⁹⁾. Also

in this current study there were no correlation between HDL-C, TG and age of thrombosis patients (r = -0.25, p . value =0.08) (r = 0.09, p . value =0.5) respectively. This result disagreed with another result, which showed that, there were significant positive correlation between TG, HDL, C and age of thrombosis patients⁽¹²⁾.

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