

**Ministry of higher education
and scientific research
university of al Diyala
college of medicine**



**EVALUATION OF HYPERTRIGLYCERIDEMIA AS A RISK
FACTOR IN STROKE PATIENTS IN BAQUBAH
TEACHING HOSPITAL**

**Thesis Submitted to the Council of the College of Medicine, Diyala University, In
Partial Fulfillment of Requirements for the Bachelor Degree in medicine and
general surgery.**

Done by:

Asmaa Abbas Mohamed

Supervised by:

Asst. Prof.dr Wisam Falih Hasan

2023-2022

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

فَاعْلَمْ أَنَّهُ الْمَلِكُ الْحَقُّ وَلَا تَعْجَلْ بِالْقُرْآنِ مِنْ قَبْلِ أَنْ يُقْضَىٰ
إِلَيْكَ وَحْيُهُ، وَقُلْ رَبِّ زِدْنِي عِلْمًا ﴿١١٤﴾

صَبَّحَهُ اللَّهُ الْعَظِيمَ

Contents

Acknowledgement

Abstract

Introduction

Patient and Method

Data Collection

Statistical methods

Results

Discussion

Conclusion

References

Acknowledgment

I would like to express my special thanks of gratitude to my supervisor (Dr. Wissam Faleh Hassan) who give me the golden opportunity to do this wonderful project of{Hypertriglyceridemia As a risk factor in stroke patients} and also help me in completing my project , I came to know about so many new things I am really thankful to them , Secondly I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame .

Abstract

Background. Hypertriglyceridemia is caused by defects in triglyceride metabolism and generally manifests as abnormally high plasma triglyceride levels. Although the role of hypertriglyceridemia may not draw as much attention as that of plasma cholesterol in stroke, plasma triglycerides, especially nonfasting triglycerides, are thought to be correlated with the risk of ischemic stroke. Hypertriglyceridemia may increase the risk of ischemic stroke by promoting atherosclerosis and thrombosis and increasing blood viscosity.

Aims of study: to clarify the hypertriglyceridemia as a risk factor for stroke patients in Baqubah teaching hospital.

Patients and methods : A cross-sectional study was conducted on patient with stroke in Baqubeh teaching hospital . A total of 100 patients included in this study from November 2022 to march 2023.

Results. 52% were male and 48% female . 50-59 age group were 35(35%) of the patient while 60-69 group age were 31(31%) , 70-79 age group were 24(24%) , 80-89 age group were 10(10%). The smoker were 52% of patients and the overweighed patients were 59% and normal weight patient were 36% and underweighted were 5% . 63% of patient were ischemic stroke and 37% of them was hemorrhage stroke . The onset were 94% sudden and 6% gradual. Preceded 63% headache , 58% fever , 74% confusion , 22% delirium , 69% asphasia , 78% Hemiparesis , 52% Dysphagia . 25% of the patient were with high level of cholesterol , 40% with high level of triglyceride , 55% of them were high level of HDL , 35% of them with high level of LDL.

Conclusions: we conclude that there is biological plausibility and epidemiological evidence to suggest that hypertriglyceridemia potentially contributes to an increased risk for stroke.

Keywords: Hypertriglyceridemia , Ischemic stroke , hemorrhage stroke.

Introduction

Hypertriglyceridemia's potential role as a risk factor for ischemic stroke is still up for debate. A growing body of research, however, shows that hypertriglyceridemia is linked to atherosclerosis, endothelial dysfunction, and a prothrombotic state, all of which may raise the risk of an ischemic stroke.(1)

Recent research suggests that hypertriglyceridemia may be associated with a higher risk of cardiovascular events, especially if high-density lipoprotein cholesterol (HDL-C) and/or low-density lipoprotein cholesterol (LDL-C) are both low.(2)

The following levels are used to classify hypertriglyceridemia in the Third Report of the National Cholesterol Educational Program and the Adult Treatment Panel (NCEP-ATP III): Normal (1.7 mmol/L), borderline-high (1.7- 2.2 mmol/L), high (2.2-5.6 mmol/L), and very high (5.6 mmol/L) blood sugar levels are all possible.(3)

The mutations of lipoprotein lipase, which is crucial for the breakdown of triglycerides and the production of HDLC particle precursors, may intensify the atherogenic lipoprotein profile.(4)

Ischemic stroke risk factors include elevated serum levels of total cholesterol, LDL, and HDL as well as low levels of HDL. There is disagreement regarding the significance of hypertriglyceridemia as a separate risk factor for ischemic stroke because there are no reliable data on the association between elevated serum triglycerides and ischemic stroke.(5)

Hypertriglyceridemia and the Possible Mechanisms of Ischemic Stroke.

Credible mechanisms by which hypertriglyceridemia might result in an ischemic stroke include atherosclerosis and thrombosis. According to recent research, postprandial hypertriglyceridemia in diabetic patients interferes with the vasodilatation process and increases oxidative stress, which in turn affects endothelial dysfunction.(6)

Correlation between systemic inflammation and elevated inflammatory markers, particularly C-reactive protein, raises the risk of cardiovascular events, especially for coronary heart disease.(7)

Numerous studies have demonstrated that carotid intima-media thickness (CIMT) is a reliable marker of early atherosclerosis and that it is correlated with increased levels of fibrinogen, circulating adhesion molecules, and inflammatory markers, all of which are individually linked to hypertriglyceridemia. Hypertension and dyslipidemia are linked to the prothrombotic state and both have a significant impact on CIMT, especially in the elderly.(8)

Triglyceride levels before meals were not linked to carotid atherosclerosis in the Framingham Heart Study, but type 2 diabetes patients' postprandial hypertriglyceridemia and CIMT were.(9)

Due to changes in the coagulation cascade and an increase in plasma viscosity, hypertriglyceridemia causes cerebrovascular events by inducing thrombosis. A significant risk factor for the progression of carotid disease and subsequent vascular events is elevated fibrinogen.(10)

Increased plasma viscosity is positively correlated with elevated levels of total cholesterol, LDL-C, total protein, fibrinogen, and triglycerides, all of which are measured separately. Due to disruption of microcirculation and endothelial dysfunction, hyperviscosity may cause tissue ischemia, which raises the risk of thrombosis and encourages stroke.(11)

Aims of study:

The aim of study was to clarify the hypertriglyceridemia as a risk factor for stroke patients in Baqubah teaching hospital .

Patients and methods

A cross-sectional study was conducted on patient with stroke in Baqubeh teaching hospital . The data was collected by using a self-completed questionnaire through face to face interview. A total of 100 patients included in this study from November 2022 to march 2023. We asked them questions contain age , gender, weight , past medical history , family history , stroke profile and lipid profile .

Statistical methods.

After collection, data were checked manually and analyzed by computer based program Statistical package of social science(SPSS) 26 version. Results were expressed as number and percentage. .

Results

A total number of (n=100) patient included from stroke patient who admitted to Baqubeh teaching hospital in this study. The number of Included patient male were (n=52) which means (52%) , the number of female included (n=48) which mean (48%). 50-59 age group were 35(35%) of the patient while 60-69 group age were 31(31%) , 70-79 age group were 24(24%) , 80-89 age group were 10(10%). The smoker were 52% of patients and the overweighed patients were 59% and normal weight patient were 36% and underweighted were 5% as shown in table 1.

Table 1: demographic characteristics of included patient.

Characteristics	Frequency	Percentage
Gender		
Male	52	52%
Female	48	48%
Age		
50-59	35	35%
60-69	31	31%
70-79	24	24%
80-89	10	10%
Smoking		
Yes	52	52%
No	48	48%
Weight		
Overweight	59	59%
Normal	36	36%
Underweight	5	5%

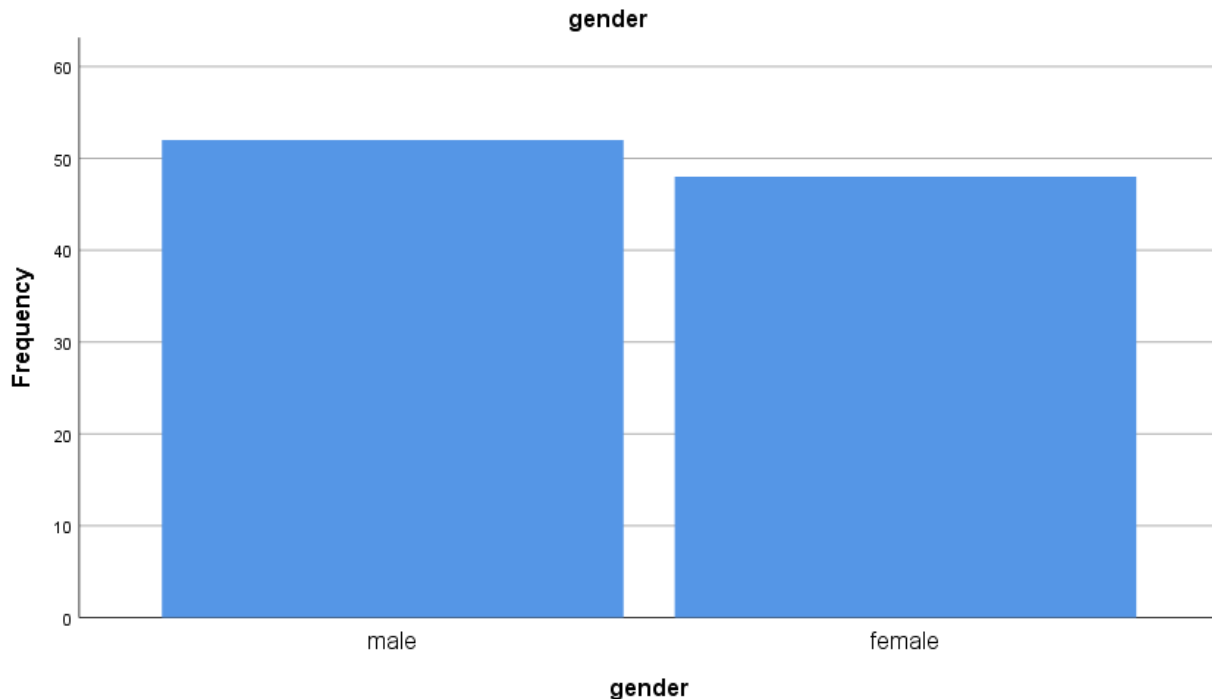


Table 2 show that the past medical history of patient 48% of them have DM and the HTN were 100% and CVA were 17% .

Table 2: past medical history .

Chronic disease	Frequency	Percentage
DM	48	48%
HTN	100	100%
CVA	17	%17

Table 3 reveal the stroke profile 63% of patient were ischemic stroke and 37% of them was hemorrhage stroke . The onset were 94% sudden and 6% gradual. Preceded 63% headache , 58% fever , 74% confusion , 22% delirium , 69% asphasia , 78% Hemiparesis , 52% Dysphagia .

The associated symptoms were: 52% Headache , 47% dizziness , 39% Vertigo , 48% Visual disturbance , 43% Syncope , 61% Loss of consciousness , 76% Limb weakness, 66% Convulsion ,64% Tremor , 74% Paresthesia , 52% Myalgia .

Table 3 : stroke profile.

Characteristics	Frequency	Percentage
Type		
Ischemic	63	63%
Hemorrhage	37	37%
Onset		
Sudden	94	94%
Gradual	6	6%
Preceded by		
Headache	63	63%
Fever	58	58%
Confusion	74	74%
Delirium	22	22%
Aphasia	69	69%
Hemiparesis	78	78%
Dysphagia	52	52%
Associated symptoms		
Headache	52	52%
Dizziness	47	47%
Vertigo	39	39%
Visual disturbance	48	48%
Syncope	43	43%
Loss of consciousness	61	61%
Limb weakness	76	76%
Convulsion	66	66%
Tremor	64	64%
Paresthesia	74	74%
Myalgia	52	52%
Previous stroke		
Yes	46	46%
No	54	54%

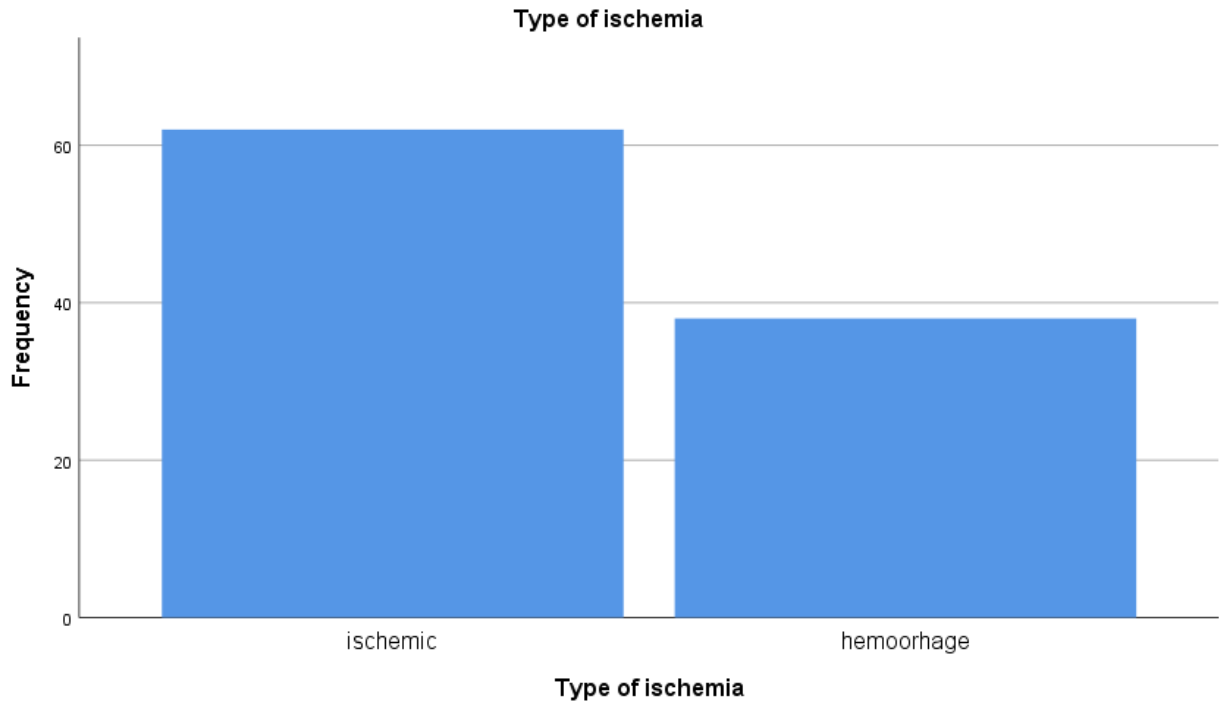


Table 4 study the lipid level , 25% of the patient were with high level of cholesterol , 40% with high level of triglyceride , 55% of them were high level of HDL , 35% of them with high level of LDL

Table 4 : Lipid profile

Lipid level	Frequency	Percentage
Total cholesterol		
Optimal level	45	45%
Borderline level	30	30%
High level	25	25%
Triglyceride		
Optimal level	35	35%
Borderline level	25	25%
High level	40	40%
HDL		
Optimal level	15	15%
Borderline level	30	30%
High level	55	55%
LDL		
Optimal level	40	40%
Borderline level	25	25%
High level	35	35%

Discussion

There have been significant efforts to identify modifiable risk factors that could decrease the incidence of ischemic stroke due to the significant burden that stroke places on our society. (IS). There are many different, independent risk factors for IS. The most common of these are atrial fibrillation, coronary artery disease, congestive heart failure, smoking, hypertension, diabetes mellitus, and disorders of lipid metabolism. Elevated total cholesterol, low-density lipoprotein cholesterol (LDL-C), and low levels of high-density lipoprotein cholesterol (HDL-C) may all be risk factors for IS, according to epidemiologic studies.(12)

In this study the number of Included patient male were (n=52) which means (52%) and the number of female included (n=48) which mean (48%). 50-59 age group were 35(35%) of the patient while 60-69 group age were 31(31%) , 70-79 age group were 24(24%) , 80-89 age group were 10(10%) and that agree with Holmes et al .(13)

The smoker were 52% of patients and the overweighed patients were 59% and normal weight patient were 36% and underweighted were 5% , this according to study of Hassing et al .(14)

The past medical history of patient 48% of them have DM and the HTN were 100% and CVA were 17% which agree with findings of Imaizumi et al .(15)

The stroke profile 63% of patient were ischemic stroke and 37% of them was hemorrhage stroke . The onset were 94% sudden and 6% gradual. Preceded 63% headache , 58% fever , 74% confusion , 22% delirium , 69% asphasia , 78% Hemiparesis , 52% Dysphagia .this consist with findings of Harrison et al .(16)

The associated symptoms were: 52% Headache , 47% dizziness , 39% Vertigo , 48% Visual disturbance , 43% Syncope , 61% Loss of consciousness , 76% Limb weakness, 66% Convulsion ,64% Tremor , 74% Paresthesia , 52% Myalgia and this agree with Lee et al .(17)

In this study we found 25% of the patient were with high level of cholesterol , 40% with high level of triglyceride , 55% of them were high level of HDL , 35% of them with high level of LDL and this agree with findings of Toth et al .(18)

Conclusions .

Based on our review of the existing evidence, we conclude that there is biological plausibility and epidemiological evidence to suggest that hypertriglyceridemia potentially contributes to an increased risk for stroke.

Recommendations .

- 1- Further study with large sample size .
- 2- Management of factors contribute to hypertriglyceridemia such as overweight , smoking .
- 3- Prospective, randomized, controlled trials should be conducted to assess the benefit of pharmacologic and dietary triglyceride reduction with respect to primary and secondary prevention of stroke.

References

1. Campbell BC, De Silva DA, Macleod MR, Coutts SB, Schwamm LH, Davis SM, et al. Ischaemic stroke. *Nat Rev Dis Primers*. 2019; 5:70.
2. Kuriakose D, Xiao Z. Pathophysiology and treatment of stroke: present status and future perspectives. *Int J Mol Sci*. 2020; 21:7609.
3. Goldstein LB, Bushnell CD, Adams RJ, Appel LJ, Braun LT, Chaturvedi S, et al. Guidelines for the primary prevention of stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2011; 42:517–584.
4. Kernan WN, Ovbiagele B, Black HR, Bravata DM, Chimowitz MI, Ezekowitz MD, et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2014; 45:2160–2236.
5. Sacco RL, Diener HC, Yusuf S, Cotton D, Ounpuu S, Lawton WA, et al. Aspirin and extended-release dipyridamole versus clopidogrel for recurrent stroke. *N Engl J Med*. 2008; 359:1238–1251.
6. Röther J, Alberts MJ, Touzé E, Mas JL, Hill MD, Michel P, et al. Risk factor profile and management of cerebrovascular patients in the REACH Registry. *Cerebrovasc Dis*. 2008; 25:366–374.
7. Glasser SP, Mosher A, Howard G, Banach M. What is the association of lipid levels and incident stroke? *Int J Cardiol*. 2016; 220:890–894.
8. Sun L, Clarke R, Bennett D, Guo Y, Walters RG, Hill M, et al. Causal associations of blood lipids with risk of ischemic stroke and intracerebral hemorrhage in Chinese adults. *Nat Med*. 2019; 25:569–574.
9. Stamler J, Neaton JD, Cohen JD, Cutler J, Eberly L, Grandits G, et al. Multiple risk factor intervention trial revisited: a new perspective based on nonfatal and fatal composite endpoints, coronary and cardiovascular, during the trial. *J Am Heart Assoc*. 2012; 1:e003640.

10. Castilla-Guerra L, Fernández-Moreno Mdel C, López-Chozas JM. Statins in the secondary prevention of stroke: new evidence from the SPARCL Study. *Clin Investig Arterioscler*. 2016; 28:202–208.
11. Tramacere I, Boncoraglio GB, Banzi R, Del Giovane C, Kwag KH, Squizzato A, et al. Comparison of statins for secondary prevention in patients with ischemic stroke or transient ischemic attack: a systematic review and network meta-analysis. *BMC Med*. 2019; 17:67.
12. Aznaouridis K, Masoura C, Vlachopoulos C, Tousoulis D. Statins in stroke. *Curr Med Chem*. 2019; 26:6174–6185.
13. Holmes MV, Millwood IY, Kartsonaki C, Hill MR, Bennett DA, Boxall R, et al. Lipids, lipoproteins, and metabolites and risk of myocardial infarction and stroke. *J Am Coll Cardiol*. 2018; 71:620–632.
14. Hassing HC, Surendran RP, Mooij HL, Stroes ES, Nieuwdorp M, Dallinga-Thie GM. Pathophysiology of hypertriglyceridemia. *Biochim Biophys Acta*. 2012; 1821:826–832.
15. Imaizumi K, Fainaru M, Havel RJ. Composition of proteins of mesenteric lymph chylomicrons in the rat and alterations produced upon exposure of chylomicrons to blood serum and serum proteins. *J Lipid Res*. 1978; 19:712–722.
16. Harrison CM, Goddard JM, Rittey CD. The use of regional anaesthetic blockade in a child with recurrent erythromelalgia. *Arch Dis Child*. 2003; 88:65–66.
17. Lee JS, Chang PY, Zhang Y, Kizer JR, Best LG, Howard BV. Triglyceride and HDL-C dyslipidemia and risks of coronary heart disease and ischemic stroke by glycemic dysregulation status: the strong heart study. *Diabetes Care*. 2017; 40:529–537.
18. Toth PP, Granowitz C, Hull M, Liassou D, Anderson A, Philip S. High triglycerides are associated with increased cardiovascular events, medical costs, and resource use: a real-world administrative claims analysis of statin-treated patients with high residual cardiovascular risk. *J Am Heart Assoc*. 2018; 7:008740.