بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / حسام الدين محمد مغربي

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات : لا يوجد

Blood Lipid Levels in Patients with Intracerebral Haemorrhage

Thesis

Submitted for Partial Fulfillment of Master Degree in Neurology and Psychiatry

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2022

Acknowledgment

First and primary, I feel always thankful to ***Allah*** *the Most Generous and Merciful.*

I wish to express my deepest thanks, gratefulness and appreciation to ***Prof. Hala Mahmoud Elkhawas*****,** *Professor of Neurology, Faculty of Medicine, Ain shams University, for her careful supervision, kind guidance, valuable instructions and generous help.*

Special thanks are due to ***Dr. Ayman Hassan Othman El Sudany,*** *Lecturer of Neurology, Faculty of Medicine, Ain shams University for his sincere efforts, fruitful encouragement.*

I am deeply thankful to ***Dr. Fatma Fathalla Mahmoud Kenawy,*** *Lecturer of Neurology, Faculty of Medicine, Ain shams University, for her great help, outstanding support, active participation and guidance.*

I would like to express my hearty thanks to all my family for their support till this work was completed.

Mina Shoukry Tamer

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List of Abbreviations

Abb.	Full term
APTT	Activated partial thromboplastin time
AVM	Arteriovenous malformations
BBB	Blood-brain barrier
CAA	Cerebral amyloid angiopathy
CBC	Complete blood picture
CT	Computed tomographic
CTA	Computed tomographic angiography
CVT	Cerebral venous thrombosis
dAVFs	Dural arteriovenous fistulas
DM	Diabetes Mellitus
DSA	Digital subtraction angiography
GCS	Glasgow Coma Scale
HDL	High-density lipoprotein
HE	Hematoma expansion
HTN	Hypertension
ICH	Intracerebral hemorrhage
INR	International Normalized Ratio
IVH	Intraventricular hemorrhage
LDL	Low-density lipoprotein
MCA	Middle cerebral artery
MRI	Magnetic resonance imaging
NIHSS	National Institutes of Health Stroke Scale
RBS	Random blood sugar
SSRIs	Selective serotonin reuptake inhibitors
TC	Total cholesterol
TGs	Triglycerides
tPA	Tissue plasminogen activator
VLDL	Very low-density lipoproteins
WHO	World health organization

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ABSTRACT

Background: Stroke is one of the leading causes of death and disability worldwide. Intracerebral hemorrhage (ICH), an important subtype of the stroke, is characterized by high mortality and morbidity rates. Compared with ischemic stroke, hemorrhagic stroke is associated with higher mortality rate and currently there is no curative treatment.

Objective: To describe the lipid abnormality and its association with clinical characteristics of intracerebral haemorrhage

Subjects and Methods: The patients were selected from inpatients in Neurology department at Ain Shams University Hospitals in the period from October 2020 to September 2021. The study included one hundred patients more than eighteen years old with primary spontaneous non traumatic intracerebral haemorrhage, documented by CT brain within 24 hours of symptoms onset.

Results: We found 67% of patients were with low TGs (<150 mg/dl), 52% with low TC (<200mg/dl), 53% with low LDL (<100mg/dl) and 67% with low VLDL levels(<40mg/dl). We found a significant association between low TGs, TC and LDL levels and incidence of ICH, unlike HDL. Follow up by CT scan after one week was done among study group, and there were nine patients (9%) died during the follow up, while eighteen patients (18%) were complicated with hematoma expansion. And we found no relation between low lipid profile and outcome of ICH as regard hematoma expansion and mortality rates.

Conclusion: We found highly statistically significant association between ICH and low TGs value. We found low TC and LDL levels were associated with increased risk of ICH. We found no significant association of HDL and risk of hemorrhagic stroke. We found no relation between low lipid profile and outcome of ICH as regard hematoma expansion and mortality rates.

Keywords: Intracerebral haemorrhage, lipid profile

INTRODUCTION

Stroke is one of the leading causes of death and disability worldwide. Intracerebral hemorrhage (ICH), an important subtype of the stroke, is characterized by high mortality and morbidity rates ***(Ma et al., 2016).***

Hemorrhagic stroke, including primary ICH and subarachnoid hemorrhage, accounts for 10% to 27% of strokes worldwide. Compared with ischemic stroke, hemorrhagic stroke is associated with higher mortality rate, with a first month fatality rate of >50% for ICH and 4.5-fold increased risk of death within the first year ***(Krishnamurthi et al., 2014).***

Intracerebral haemorrhage (ICH) alone accounts for about 10% to 15% of strokes and currently no curative treatment options. Therefore, identification of modifiable risk factors is highly important. Establishing the risk factors for ICH and cerebral microbleeds may aid in the early detection of persons at an increased risk and prevent its occurrence. Low levels of serum total cholesterol (TC) have been found as a possible risk factor for intracerebral hemorrhage ***(Wieberdink et al., 2011).***

Cholesterol is essential for many normal bodily functions and plays an important role in cell membrane that surrounds all cells. Several mechanisms may explain the relationship between cholesterol level and ICH. It hypothesized that reduced

cholesterol levels may increase risk of ICH as lower cholesterol level results in a weakened endothelium. Potentially weakened endothelium may be more susceptible to micro aneurysms, which are the chief pathological finding of cerebral hemorrhage. Moreover, reduced cholesterol level may be associated with increased erythrocyte fragility and decreased platelet aggregation ability ***(Kibria et al., 2018).*** Other studies suggest that low cholesterol levels may promote arterial muscle necrosis ***(Cheng et al., 2020).***

While on the other hand, other studies found that primary ICH can be associated with high TC level, high low-density lipoprotein (LDL) level and low high-density lipoprotein (HDL) level with no significant effect of triglycerides (TGs) ***(Prokin et al., 2014).***

AIM OF THE STUDY

To describe the lipid abnormalities and their association with the clinical characteristics of intracerebral hemorrhage.

Stroke is the second leading cause of death and the main cause of disability worldwide ***(Habibi-Koolaee et al., 2018).*** Intracerebral haemorrhage (ICH) causes the majority of stroke morbidity and mortality ***(Dowlatshahi et al., 2016).***

According to WHO definition of stroke, it is a rapidly developing clinical signs of focal [or global] disturbance of cerebral function, lasting >24 hours or leading to death, with no apparent cause other than that of vascular origin ***(Coupland et al., 2017).***

According to American Heart Association/American Stroke Association, ischemic stroke is defined on the basis of clinical and tissue criteria as brain, spinal cord, or retinal cell death attributable to ischemia, based on neuropathological, neuroimaging, and clinical evidence of permanent injury. Intracerebral hemorrhage is defined as rapidly developing clinical signs of neurological dysfunction attributable to a focal collection of blood within the brain parenchyma or ventricular system that is not caused by trauma ***(Feigin et al., 2018).***

Epidemiology

Globally, stroke is the second cause of death (11·6% of total deaths) after ischemic heart diseases and the third cause of death and disability combined after neonatal disorders and ischemic heart disease. In 2019, there were 12·2 million

incident strokes and 101 million prevalent strokes and 6·55 million deaths from stroke. Intracerebral haemorrhage constituted 27.9% (3.41 million) of all new strokes in 2019, with two-fold greater proportion of ICH in low-income countries compared with high-income countries (29·5% vs 15.8%) ***(Feigin et al., 2021).***

In Egypt, the incidence and prevalence of stroke are found high relative to other countries. The average crude prevalence rates weighted by sample population size was 613/100,000 and the average crude incidence rates weighted by sample population size was 202/100,000 between 1990 and 2016. Hemorrhagic stroke accounted for 7-13% of all strokes ***(Abd-Allah et al., 2018).***

Spontaneous intracerebral haemorrhage can be classified anatomically into supratentorial (85–95%), including deep (50–75%) and lobar (25-40%), and infratentorial haemorrhage. Intracerebral haemorrhage can also be classified on the basis of the underling etiologies as hypertension (HTN) (30–60%), cerebral amyloid angiopathy (CAA) (10–30%), anticoagulation (1–20%) and vascular structural lesions (3–8%) ***(Hankey, 2017).***

Risk factors for intracerebral hemorrhage

Risk factors for ICH can be categorized into modifiable and non-modifiable risk factors. Modifiable as HTN, increased alcohol intake, decreased LDL, decreased TGs, medications (for example antiplatelets, anticoagulants, selective serotonin reuptake inhibitors and statin), cigarette smoking, and drugs of abuse (for example, cocaine, heroin, amphetamines, and ephedrine). Non-modifiable risk factors as cerebral amyloid angiopathy ***(Garg and Biller, 2019).***

Another classification, Risk factors, can be categorized into primary and secondary factors. Primary as HTN and CAA ***(Gross et al., 2019).*** Hypertension is the most common risk factor which is present in up to 70% of ICH patients and is associated with higher morbidity and mortality rates ***(Wilkinson et al., 2018).***

The secondary causes include tumors, aneurysm rupture, moyamoya disease, vasculitis, coagulopathy, cerebral venous thrombosis, hemorrhagic transformation of ischemic stroke and vascular malformations (including arteriovenous malformation, arteriovenous fistulas, and cavernous malformations) ***(Gross et al., 2019).***