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The Role of High-Density Lipoprotein Cholesterol in Stroke Risk and Outcomes: A Comparison Between Ischemic and Hemorrhagic Stroke

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Abstract

The term Cerebrovascular accident (CVA) or stroke refers to an important medical condition responsible for significant mortality rates and disability in global statistics. The two fundamental types of strokes exist as ischemic and hemorrhagic disorders. The medical community considers High-Density Lipoprotein (HDL) cholesterol good cholesterol because it safeguards both heart health and brain functions. Multiple research studies show HDL might influence strokes but scientists still need to understand the specific connection between these elements.

The purpose of this research is to determine the connection between HDL cholesterol and cerebrovascular accidents by measuring its levels between patients with ischemic stroke and those with hemorrhagic stroke. The researchers studied 120 patients organized into two distinct groups where 60 participants exhibited ischemic stroke symptoms together with 60 patients diagnosed with hemorrhagic stroke. Research investigators collected blood samples for examination of HDL cholesterol levels which examined their relationship to stroke types and their seriousness.

Patients who had an ischemic stroke revealed considerable decreases in HDL cholesterol when researchers compared them to patients who experienced hemorrhagic strokes. The research showed that both populations had stroke severity correlated negatively with HDL levels thus indicating patients with reduced HDL experienced more severe consequences.

The research shows that reduced HDL cholesterol levels increase the chance of getting ischemic stroke and reduce survival chances following a stroke.

The research examines High-Density Lipoprotein and its influence on stroke types particularly Ischemic and Hemorrhagic strokes in addition to cholesterol levels in Cerebrovascular accidents and measured HDL cholesterol concentrations.

Introduction

Strokes referred to as cerebrovascular accidents represent a major global reason for death and disability that persist following an attack. The brain cells die when the circulation of blood to one section disrupts during strokes. The two stroke categories include the blood vessel blockage which triggers ischemic stroke and hemorrhagic stroke which happens through brain

bleeding. Different kinds of strokes can lead to various severe outcomes including paralysis and death when patients need long-term rehabilitation processes. [1]

Multiple risk elements contribute to stroke development whereas hypertension together with diabetes and tobacco use alongside obesity and elevated cholesterol levels function as the main elements. Most medical professionals consider High-Density Lipoprotein (HDL) cholesterol as a protective factor against heart disease and stroke because it functions as "good cholesterol." The bloodstream clearing action of HDL cholesterol carries away surplus cholesterol from blood vessels until the liver processes and eliminates it. High-Density Lipoprotein functions by carrying away fatty materials from arteries which leads to reduced cardiovascular risks. [2]

The correlation between HDL cholesterol and heart disease is well established yet scientists still need to unfold its effects on stroke risks. Low HDL cholesterol levels show evidence of heightening ischemic stroke risk based on research but studies also demonstrate HDL effects on hemorrhagic stroke outcomes according to findings [3, 4]. A full comparison between HDL influences on these stroke types remains unestablished.

This study investigates the role of HDL cholesterol in cerebrovascular accidents and aims to compare the levels of HDL cholesterol in patients with ischemic stroke and hemorrhagic stroke. This study investigates the relationship to determine whether high-density lipoproteins (HDL) levels hold potential as useful biomarker indicators for stroke prediction and recovery outcomes.

Aim and Objectives:

Aim:
To explore the role of High-Density Lipoprotein (HDL) cholesterol in cerebrovascular accidents (stroke) and compare HDL levels in patients with ischemic and hemorrhagic strokes.

Objectives:

1. To assess HDL cholesterol levels in patients with ischemic and hemorrhagic strokes.
2. To determine if lower HDL cholesterol levels are associated with higher stroke severity and worse outcomes.

Materials and Methods:

The study involved 120 patients who were diagnosed with stroke and admitted to the hospital. The patients were divided into two groups: 60 patients with ischemic stroke and 60 patients with hemorrhagic stroke. Blood samples were taken from all participants to measure HDL cholesterol levels. The severity of the stroke was assessed using the NIH Stroke Scale (NIHSS), which is a common tool used to measure the neurological impact of a stroke.

Inclusion Criteria:

- Patients aged 18-80 years.
- Confirmed diagnosis of ischemic or hemorrhagic stroke.
- Written consent to participate in the study.

Exclusion Criteria:

- Patients with pre-existing cardiovascular diseases other than stroke.
- Those with conditions that might affect cholesterol metabolism, such as thyroid disorders or severe liver disease.
- Patients on medications that significantly alter lipid levels, like statins, during the study period.

Data analysis was performed to compare HDL levels between the two stroke types and assess the relationship between HDL levels and stroke severity.

Results:

Table 1: HDL Cholesterol Levels in Ischemic and Hemorrhagic Stroke Patients

Stroke Type	Mean HDL Cholesterol (mg/dL)
Ischemic Stroke (n=60)	38 ± 6
Hemorrhagic Stroke (n=60)	45 ± 8

Table 2: Correlation Between HDL Levels and Stroke Severity (NIHSS Scores)

Stroke Type	Mean NIHSS Score	Mean HDL (mg/dL)	Correlation Coefficient (r)
Ischemic Stroke (n=60)	14 ± 5	38 ± 6	-0.45**
Hemorrhagic Stroke (n=60)	16 ± 6	45 ± 8	-0.39**

Significant negative correlation ($p < 0.05$) between HDL levels and stroke severity in both groups.

Discussion:

HDL cholesterol appears to influence the seriousness of cerebrovascular accidents and their associated outcomes according to these study findings. HDL cholesterol levels remained substantially lower among patients who suffered from ischemic stroke than among hemorrhagic stroke patients. The observation matches previous studies which demonstrate that low HDL cholesterol levels might lead to ischemic stroke formation possibly because of its artery plaque-forming and lipid metabolism functions. [5,6]

The researchers discovered stroke severity increased with decreasing HDL cholesterol levels in both ischemic stroke and hemorrhagic stroke patient groups. The research data demonstrates that reduced HDL cholesterol properties directly link to worsened neurological deficit regardless of stroke type. Data from this study supports the possibility that HDL cholesterol protects stroke patients during recovery phases even though they do not prove causality between variables. [7,8] The specific processes which HDL controls in stroke treatment still require investigation. The brain protective function of HDL includes reducing inflammation and oxidative stress which cause damage during a stroke. The connection between HDL cholesterol and hemorrhagic stroke requires more research until scientists fully comprehend how this cholesterol affects this stroke type [9-11].

Conclusion:

If patients endure either an ischemic or hemorrhagic stroke their stroke severity tends to increase when their HDL cholesterol levels decrease. The relationship between stroke risk and recovery along with HDL cholesterol requires additional research to understand better its underlying mechanisms yet it appears promising as a stroke biomarker. Following HDL levels serves as significant information for managing stroke conditions while guiding medical decisions for patients likely to experience severe stroke results.

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