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PREVALENCE OF PREDIABETES, DYSLIPIDEMIA AND C-REACTIVE PROTEIN LEVELS AMONG STROKE PATIENTS

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Abstract

Background: Stroke is characterized by the sudden onset of neurological deficits lasting more than 24 hours due to a focal vascular cause. Stroke patients often exhibit hyperglycemia and dyslipidemia, with elevated levels of C-reactive protein (CRP) associated with an increased risk of ischemic stroke. Understanding the glycemic status, lipid profile, and CRP levels in stroke patients is crucial for effective management and prevention. **Objective:** This study aimed to assess the glycemic status, lipid profile, and CRP levels in stroke patients admitted to a teaching institute in northeast India. **Methods:** A cross-sectional hospital-based study was conducted at the Department of General Medicine Great Eastern Medical School and Hospital Ragolu,Srikaulam.Data analysis was performed using SPSS software version 15, employing appropriate statistical tests. **Results:** Among the 150 stroke patients included in the study, 55% were found to be prediabetic, 35% were known diabetics, and 10% were newly diagnosed diabetics. Additionally, 60% of patients had hypertension. Ischemic stroke was predominant (75%) compared to hemorrhagic stroke (25%). Hypercholesterolemia was observed in 70% of patients, while 65% had hypertriglyceridemia. Moreover, 75% exhibited raised serum LDL levels, and 60% had decreased serum HDL levels. Notably, 65% of the patients had elevated serum CRP levels, with 60% of ischemic stroke patients and 5% of hemorrhagic stroke patients showing elevated CRP levels. **Conclusions:** Prediabetes and newly diagnosed diabetes are prevalent in stroke or TIA patients, emphasizing the need for early detection and intervention. Considering the escalating prevalence of prediabetes, targeting it for primary and secondary prevention could be paramount. Additionally, early identification of dyslipidemia and its management, including drug therapy, dietary modifications, and lifestyle changes, could mitigate stroke risk. However, the cross-sectional nature of this study warrants further validation through long-term prospective studies.

Introduction

Stroke is the second leading cause of death worldwide. While stroke has grown in incidence worldwide, it is declining among the affluent and rising among those with less access to medical care.1 The metabolic abnormalities that are often associated with stroke are hyperglycemia and dyslipidemia2.In their study, Zhang et al. highlighted that individuals with abnormal glucose regulation, encompassing prediabetes and diabetes, face twice the risk of experiencing an ischemic stroke and exhibit poorer survival rates following an acute stroke episode. Prior research has indicated that approximately one-third of patients suffering from ischemic stroke have prediabetes, while between 17.5% to 37.5% of stroke patients without

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prior diabetes history are found to have undiagnosed newly developed diabetes 3.Susanne Fonville further noted that among individuals without prior diabetes who recently experienced a stroke, the prevalence of prediabetes ranges from 23% to 53%. Although prediabetes appears to modestly predict the occurrence of stroke, it significantly doubles the risk of recurrent stroke 4. Additionally, dyslipidemia emerges as a significant risk factor for atherosclerosis and stands as a primary predictor for cardiovascular diseases, including stroke. The anti-inflammatory and antioxidant attributes of high-density lipoprotein (HDL) have been observed to potentially mitigate the risk of thrombosis by impeding low-density lipoprotein (LDL) oxidation, curtailing the expression of adhesion molecules, and reducing platelet activation and aggregation. Elevated triglyceride (TG) levels, especially in conjunction with low HDL and high LDL levels, have been associated with an increased risk of stroke. Studies have demonstrated a positive correlation between carotid intima-media thickness and elevated LDL cholesterol (LDL-C) levels 5. The prevalence of elevated C-reactive protein (CRP) levels was found to be highest among patients diagnosed with cardioembolic stroke (83.3%), followed by large artery atherosclerosis (72%), small artery disease (50%), stroke of other determined etiology (40%), and stroke of undetermined etiology (49%) 6.A robust and sustained inflammatory response, as indicated by elevated CRP levels, has been linked to poorer outcomes. Meta-analyses have indicated that heightened baseline CRP levels are independently associated with an increased risk of ischemic stroke 7. Moreover, elevated CRP levels have been correlated with larger infarct size, higher likelihood of hemorrhage, severe neurological deficits, and worse overall outcomes 8.

Methods And Materials

STUDY DESIGN: Descriptive type of cross sectional study

STUDY PERIOD: March 2022- Feb 2023

STUDY AREA: Department of General Medicine Great Eastern Medical School and Hospital Ragolu,Srikaulam

SAMPLE TECHNIQUE: Census sampling, which involved including all stroke patients admitted during the specified period, was employed for this study.

INCLUSION CRITERIA: Patients with the first episode of stroke confirmed by imaging were eligible for inclusion in the study.

EXCLUSION CRITERIA:

Exclusion Criteria:

1. Space-occupying lesions.
2. Cerebral venous thrombosis.
3. Transient ischemic attacks (TIAs).
4. Recurrent cerebrovascular accidents.
5. Stroke mimics.
6. Acute infections.
7. Patient refusal.

METHOD OF DATA COLLECTION:

All patients underwent a thorough personal assessment, including detailed history-taking and physical examination, conducted by trained medical personnel. Necessary investigations were promptly performed following admission. Informed consent was obtained from each patient for the collection of required data. A pre-designed structured form was utilized to systematically record pertinent information from each participant included in the study.

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Results

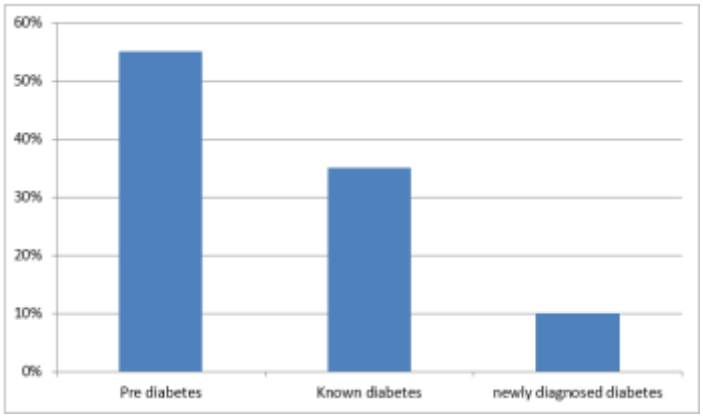

FIGURE 1: Glycemic status among stroke patients

Out of 150 patients in the study, 55% of the patients were diagnosed as pre diabetic and 35% of the patients were diagnosed as known diabetic and 10% of them were newly diagnosed as diabetic.

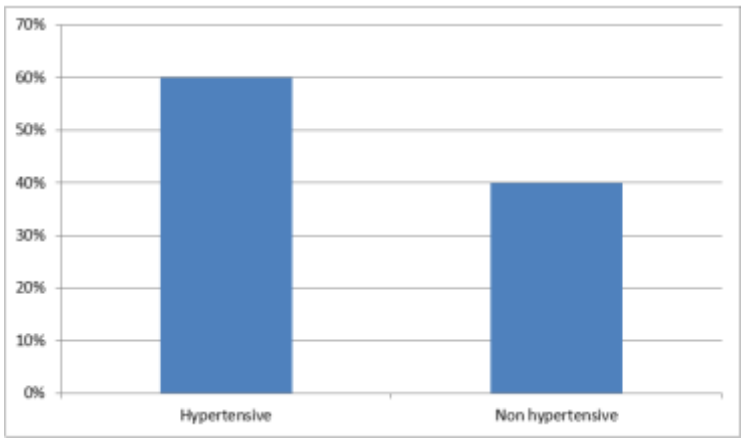

FIGURE 2: Hypertension distribution among stroke patients

In our study, 60% of the included patients were hypertensive.

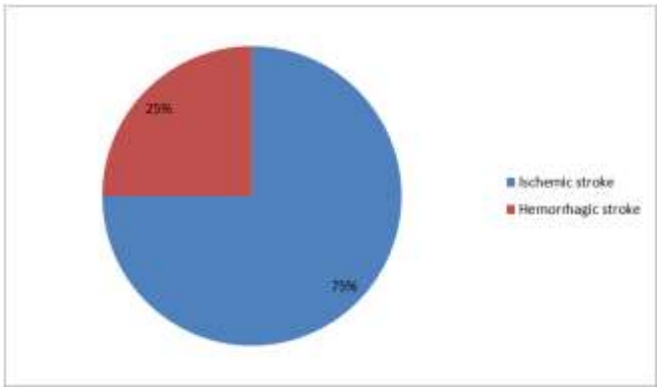

FIGURE 3: Stroke distribution among patients

The stroke distribution in our study: 75% of Ischemic and 25% of hemorrhagic.

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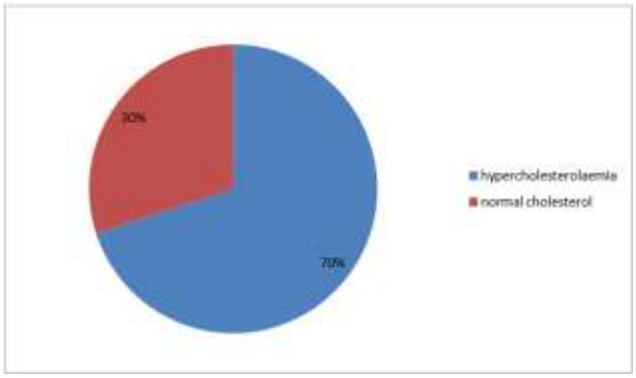

FIGURE 4: Distribution of cholesterol level among stroke patients

Among the 200 patients, 70% were diagnosed as hypercholesterolaemia and 30% were normal.

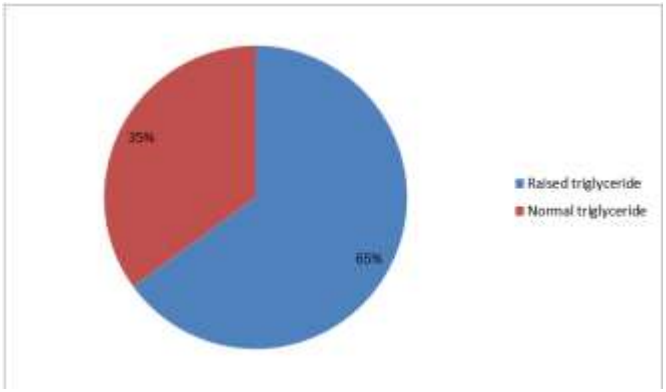

FIGURE 5: Triglyceride level distribution among stroke patients

65% patients had hypertriglyceridemia

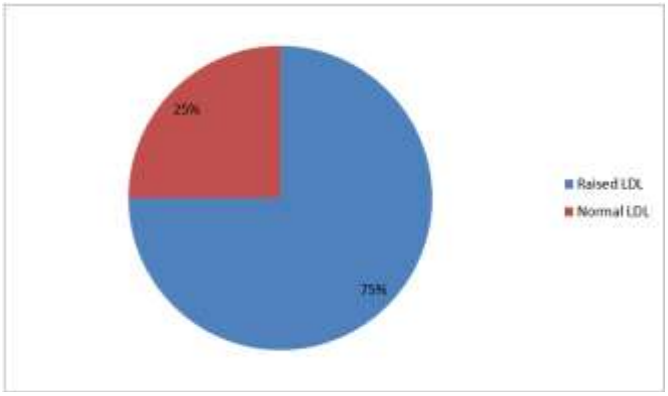

FIGURE 6: LDL distribution among stroke patients

75% of the patients was found to have raised LDL levels.

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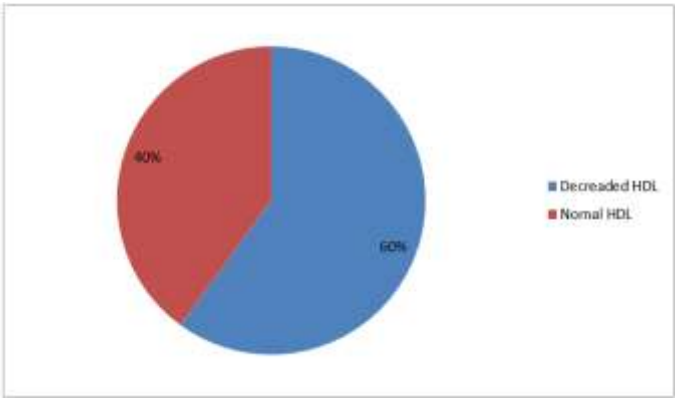

FIGURE 7: HDL distribution among stroke patients

60% of the patients that suffered stroke was found to be have decreased HDL levels.

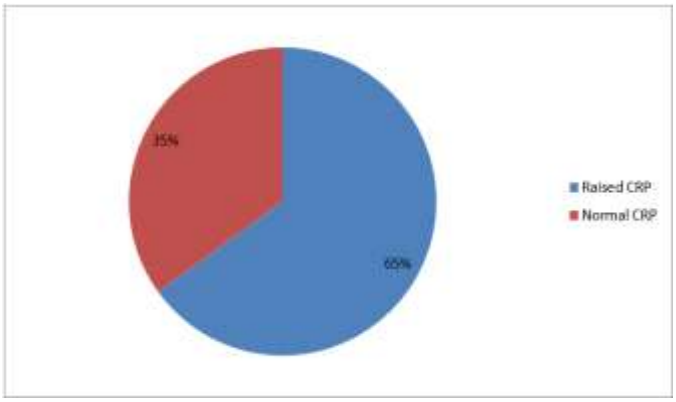

FIGURE 8: Distribution of CRP level among stroke patients

Among the 150 patients included in the study, 65% of the patients were found to have CRP and in this 60% were of ischemic stroke and 5% were of hemorrhagic stroke.

Discussion

This cross-sectional study was carried out at Department of General Medicine Great Eastern Medical School and Hospital Ragolu,Srikaulam to investigate the glycemic status, prevalence of prediabetes and dyslipidemia, and levels of C-reactive protein among hospitalized stroke patients.

A total of 150 stroke patients was included in this study, revealing a predominance of males, aligning with findings from a previous investigation by Jeyaraj et al 9. Among these patients, 55% were identified as prediabetic, 35% had known diabetes, and 10% were newly diagnosed with diabetes. Notably, individuals with ischemic stroke were more likely to have prediabetes or newly diagnosed diabetes compared to those with hemorrhagic stroke, consistent with observations from Susanne et al.'s study, which reported 52% as prediabetic and 27% as newly diagnosed with diabetes 4.

Among the 150 patients, 75% presented with ischemic stroke while 25% had hemorrhagic stroke. A significant proportion (70%) exhibited hypercholesterolemia, with the majority experiencing ischemic stroke compared to hemorrhagic stroke . A statistically significant positive correlation (p-value of 0.000) was noted between serum total cholesterol levels and stroke incidence. Similarly, hypertriglyceridemia was observed in 65% of the patients, with the majority suffering from ischemic stroke compared to hemorrhagic stroke. A significant positive correlation (p-value of 0.005) was established between serum triglyceride levels and stroke. Furthermore, 75% patients displayed elevated serum LDL levels, with a substantial

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proportion experiencing ischemic stroke and a smaller percentage presenting with hemorrhagic stroke. A statistically significant positive correlation (p-value of 0.000) was found between serum LDL levels and stroke occurrence. Additionally, 60%% of ischemic stroke patients and 5% of hemorrhagic stroke patients exhibited elevated CRP levels. A statistically significant positive correlation (p-value of 0.005) was identified between CRP levels and stroke.

These findings are consistent with previous studies, such as the one conducted by Ayeskanta et al., which reported similar associations between lipid profiles, CRP levels, and stroke incidence 10. Moreover, Chaudhuri et al. demonstrated a strong association between high CRP levels and acute ischemic stroke 11.

Conclusion

Preventing prediabetes and newly diagnosed diabetes is crucial for patients recovering from stroke or TIA. Adopting a healthy lifestyle, including regular physical activity and maintaining a healthy weight, is the most effective prevention strategy. Routine screening for prediabetes and diabetes, along with incorporating prediabetes treatment into prevention guidelines, can significantly reduce stroke risk. Similarly, early detection of dyslipidemia and its management through medication, dietary adjustments, and lifestyle changes are essential for stroke prevention. Emphasizing personalized medical approaches guided by expert opinions and guidelines is paramount for effective prevention strategies.

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