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ACUTE ISCHEMIC STROKE;
CORRELATION BETWEEN HIGHER TOTAL CHOLESTEROL LEVEL AND HIGH BARTHEL INDEX SCORE IN PATIENTS

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ABSTRACT... Among all deaths, 40-50% are due to vascular events and out of these 10% are due to stroke. More than 66% of the global stroke occurrence is in developing countries, where the average age of patients with stroke is 15 years less than in developed countries. **Objectives:** To determine the correlation between higher total cholesterol level and high Barthel Index score(estimate of functional daily independent activity level) in patients with acute ischemic stroke. **Design:** Cross sectional study. **Period:** May 2013 to Apr 2014. **Setting:** Medical Units of DHQ and Allied Hospital, Faisalabad. **Methodology:** Sample size of 200 patients was collected and patients were included through Consecutive (non-probability) sampling technique. All patients underwent CT scan Brain from the radiology department of the hospital to determine the respective changes (hypo dense area) of the ischemic stroke. Fasting serum cholesterol was measured in all patients after an overnight fast of 12 hours. Then patients were assessed by using Barthel Index score (BI). The data was analyzed by using SPSS version 16.0. Spearman Rank correlation coefficient was calculated to BI score in patients with ischemic stroke. **Results:** The mean age of the patients was noted as 61.76±11.55 years. In this study 55.50% were males and 44.50% patients were females. The mean total cholesterol value of patients was noted as 251.58±71.15 mg/dl. Out of 200 patients, 111(55.5%) patients had high cholesterol (>200mg/dl) whereas 89(44.5%) patient had low cholesterol of(<200mg/dl).In statical analysis the results showed that the mean value of total Barthel index score was 57.50±19.52. The study results described that 51.50% patients had high Barthel index score (>53) whereas 48.50% patients had low Barthel index score (<53). Spearman correlation coefficient was calculated between high TC and high BI score as r= 0.641. This value was statistically significant i.e. p-value=0.000*. **Conclusions:** With the help of this study, we found a significant positive relationship between high TC and high BI score in patients presented with ischemic stroke. Now we can better prognosticate the functional outcome of ischemic stroke in our patients.

Key words: Ischemic stroke (IS), Barthel Index (BI)score, Total Cholesterol (TC)level, Spearman correlation, prognosis

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INTRODUCTION

Among all deaths, 40-50% are due to vascular events and out of these 10% are due to stroke[1]. More than 66% of the global stroke occurrence is in developing countries, where the average age of patients with stroke is 15 years less than in developed countries[2]. According to Pakistan Stroke Society, the estimated stroke incidence in Pakistan is close to 250 per lac population, which means that there are 350,000 new stroke patients every year in Pakistan[3]. Ischemic stroke is the most common cause of stroke in Pakistan. In one study it was reported that 72% of the patients presenting in the hospital with neurological deficit had ischemic stroke and 28% had hemorrhagic stroke[4].

Relation of higher total cholesterol and triglycerides with ischemic heart disease is well established and high cholesterol levels are estimated in 56% of ischemic heart disease patients worldwide[5]. However, High serum cholesterol levels, as a risk factor for ischemic stroke, have been quite controversial in recent times. It has been observed in several studies that in acute phase higher cholesterol and triglyceride levels are associated with better outcome after ischemic stroke[6,7].

These observations have raised the question about high cholesterol level as a risk factor for atherosclerosis. In one of the studies, it was demonstrated that patients with acute ischemic stroke who had a higher serum cholesterol in acute phase i.e, on admission, had a better Barthel Index score (r=0.211, p-value=0.029)[6]. It was reported that Higher total cholesterol at the acute phase of ischemic stroke turned out to be a favourable prognostic factor for long-term motor functions[8]. This showed high TC at admission is correlated with better functional outcome.

The rationale of this study was to find a relationship of higher cholesterol levels with the recovery of acute ischemic stroke by assessing the clinical improvement of the patients, in terms of Barthel index score. Regarding this, no specific study has yet been conducted in Pakistan. With the help of this study, we would be able to better prognosticate the functional outcome of ischemic stroke in our patients. This study did not only project a specific correlation of higher cholesterol level with higher barthel scores, but also implies that this parameter may help us to determine the prognosis of an ischemic stroke.

MATERIAL AND METHOD

Inclusion Criteria

All the patients of both gender , age of 18 years or more having signs and symptoms of acute ischemic stroke within previous 48 hours and diagnosed as having ischemic stroke (hypodense area) on CT scan brain.

Exclusion criteria

- Patients with a history of a previous major stroke, as there may be a confusion about the onset of new stroke.
- Patients having hemorrhagic stroke.
- Focal neurological deficit lasting less than 24 hour, to rule out Transient Ischemic Attacks(TIA).

Data collection Procedure

After taking approval from the ethical committee, 200 patients who fulfilled selection criteria were enrolled in the study from emergency of the Medicine Department. Informed consent was obtained from attendants of each patient. Demographic information (name, age, gender, contact) of the patient was also obtained. All the patients underwent CT scan Brain from the radiology department of the hospital to determine the respective changes (hypodense area) of the ischemic stroke. Fasting serum cholesterol was measured in all patients after an overnight fast of 12 hours. Then patients were assessed for Barthel Index score (BI). Higher total cholesterol and high BI score were labeled after assessing the laboratory and clinical findings .Data was recorded on pre-designed proforma.

Data Analysis

The data was analyzed by using SPSS version 16.0. Mean ± S.D was calculated for continuous variables including age, serum total cholesterol and BI score. Frequency and percentage were calculated for categorical variables i.e. gender, site of stroke, high cholesterol level. Spearman Rank correlation coefficient was calculated to measure the correlation between higher total cholesterol level and high BI score in patients with ischemic stroke. P-value<0.05 was considered as significant.

RESULTS

Total 200 patients were enrolled in this study. The mean age of the patients was noted as 61.76±11.55 years with minimum and maximum age values of 25 and 80 years respectively. Table-I In this study 111 (55.5%) patients were males and 89 (44.5%) patients were females. The male to female ratio was 1.25:1.

Age (Years)	n	200
	Mean	61.76
	SD	11.55
	Minimum	25
	Maximum	80

Table-I. Descriptive statistics about age (Years) of the patients

The mean total cholesterol value of patients was noted as 251.58±71.15 mg/dl with minimum and maximum values of 125 and 381 mg/dl respectively. Table-II

Total cholesterol	n	200
	Mean	251.58
	SD	71.15
	Minimum	125
	Maximum	381

Table-II. Descriptive statistics about total cholesterol of the patients

Out of 200 patients, 111(55.5%) patients had high cholesterol (>200mg/dl) whereas 89(44.5%) patients had low cholesterol of(<200mg/dl). Table-III

		Frequency	Percent
Total Cholesterol	>200mg/dl	111	55.5
	<200mg/dl	89	44.5
	Total	200	100.0

Table-III. Frequency distribution about high total cholesterol of the patients

In this study the results showed that the mean value of total Barthel index score was 57.50±19.52 with minimum and maximum values of 125 and 381 respectively. Table-IV

Barthel Index score	n	200
	Mean	57.50
	SD	19.52
	Minimum	25
	Maximum	100

Table-IV. Frequency distribution about Barthel score of the patients

The study results described that 51.50% patients had high Barthel index score (>53) whereas 48.50% patients had low Barthel index score (<53).

The study results showed that total 111 patients who had high TC, 89 were from high BI score and 22 were from low BI score. Similarly 89 patients who had low TC level, 14 had high BI score and 75 had low BI score. Spearman correlation coefficient was calculated between high TC and high BI score as r= 0.641. This value was statistically significant i.e. p-value=0.000*. Table-V

		Barthel Index score		Total
		>53	<53	
TC	>200mg/dl	89 (86.4%)	22 (22.7%)	111 (55.5%)
	<200mg/dl	14 (13.6%)	75 (77.3%)	89 (44.5%)
Total		103 (100%)	97 (100%)	200 (100%)

Table-V. Comparison of High TC with High BI score of the patients

*Spearman correlation coefficient = r=0.641 p-value=0.000**

DISCUSSION

Cerebrovascular disease is a major cause of morbidity and mortality worldwide. Stroke is defined as the rapidly developing symptoms and / or signs of neurological deficit with no apparent cause other than that of vascular origin[09-12].

The present study was carried out on 200 ischemic stroke patients of high cholesterol level, admitted in DHQ and Allied hospital medical units Faisalabad, with an aim to determine the correlation between higher total cholesterol level and high Barthel Index score in patients with acute ischemic stroke. Our study showed that 55.50% were males and 44.50% were females. Similar results were also seen in the stroke study done in Nepal by Bhalla D, et al in which, total of 150 stroke patients studied, 104 were males and 46 were females with male: female 2.3:1 ratio[13]. Mumtaz AM, et al in Pakistan, also in their study showed that out of 88 stroke patients, 62 (70.5%) were males and 26 (29.5%) were females[14]. This finding is consistent with well known fact that males are more prone to atherosclerosis.

Study done in Nepal by Krishna CD, et al found the mean age was 61.65 ±14.9 years, ranging from 20 to 100 years[15]. The findings were similar to our study in which the mean age of the patients was noted as 61.76±11.55 years with minimum and maximum age values of 25 and 80 years respectively. Mean age was higher in another study done by Efstathiou SP, et al[16] and similarly in the study done by Olindo S, et al mean age was 71.2±14 years[17]. It was also consistant that atherosclerosis increases with age.Kate Tilling,

et al followed 299 subjects for BI score. The mean BI was noted at each occasion for all patients. Mean BI increased initially and then decreased slightly between 4 months and 1 year. The average pattern of recovery was an initial increase in BI, then a longer-term plateau and then a decline[17]. Our study results showed the mean value of BI as 57.50±19.52 with range of 25 and 100.Another study done by Vincent N, et al showed that 39 patients (62%) had a Barthel Index score ≥85 and 24 (38%) had median Barthel Index score of 25 (interquartile range, 5 to 65). This study also showed the correlation between the volume of the early DWI and the clinical outcome. The weak correlation can likely be attributed to both the numerous additional factors and the relative inadequacy of functional outcome scales[18]. Another study showed that patients with high cholesterol levels (N250 mg/dL) had a 2.2-fold lower risk of death and a 2.1-fold lower risk of a poor functional recovery at 1 month[19]. Low cholesterol and triglyceride levels have been found to be strong independent predictors of in-hospital mortality after intracerebral hemorrhage[20].

Cholesterol may act as a buffer for neutralizing a proportion of the free radicals and thereby preventing the neuronal tissue from injurious effect of free radicales, so neuronal tissue survives more and functional outcome is better[20,21].

In a study among critically ill surgical patients, post-operative serum cholesterol levels below 40 to 80 mg/dL were associated with a 2- to 3.5-fold increased risk of death compared with normal cholesterol levels[22], so perhaps the low cholesterol level did not buffer the free radicals adequately. Similarly, a study of 2909 trauma patients reported that a serum level of cholesterol below 50 to 60 mg/dL was significantly associated with an increased mortality rate (OR 2.0–5.1)[23]. Pan SL, et al. in their study repeatedly measure BI scores, the TC levels and baseline BI. Here higher TC levels were associated with better functional outcomes.(r=0.211,p-value=0.029)[6]. Our study results also showed the significance and positive correlation between the BI score and HTC of ischemic stroke patients .

CONCLUSIONS

With the help of this study, we found a significant positive relationship between high TC and high BI score in patients presented with ischemic stroke. We have now gained local evidence with the help of which we can now update local guidelines. Now we can better prognosticate the functional outcome of ischemic stroke in our patients.

REFFERENCES

1. Nagaraj SK, Pai P, Bhat G, Hemalatha A. **Lipoprotein (a) and other lipid profile in patients with thrombotic stroke: Is it a reliable marker?** Journal of laboratory physicians. 2011;3(1):28.
2. Mishra NK, Khadilkar SV. **Stroke program for India.** Annals of Indian Academy of Neurology. 2010;13(1):28.
3. Khealani BA, Hameed B, Mapari UU. **Stroke in Pakistan. Journal of the Pakistan Medical Association.** 2008;58(7):400.
4. Shah N, Ataullah S. **Frequency of cerebral infarction and haemorrhage in the patients of stroke.** Journal of Ayub Medical College, Abbottabad: JAMC. 2009;21(4):102.
5. Jeenger J, Sharma D, Sushil C, Vijayvergiya D, Sanadhya R. **Relationship of personality characteristics and stressful life events to Myocardial Infarction: A case control study.** Journal of Mental Health and Human Behaviour. 2013:45.
6. Pan S-L, Lien I, Chen TH-H. **Is higher serum total cholesterol level associated with better long-term functional outcomes after noncardioembolic ischemic stroke? Archives of physical medicine and rehabilitation.** 2010;91(6):913-7. Li W, Liu M, Wu B, Liu H, Wang L-C, Tan S. Serum lipid levels and 3-month prognosis in Chinese patients with acute stroke. Advances in therapy. 2008;25(4):329-41.
8. Robert Teasell M. **Secondary Prevention of Stroke Section 8.5-Hyperlipidemia.**
9. Shyu W-C, Lin S-Z, Lee C-C, Liu DD, Li H. **Granulocyte colony-stimulating factor for acute ischemic stroke: a randomized controlled trial.** Can Med Assoc J. 2006;174(7):927-33.
10. Brown MM. **Stroke epidemiology and clinical features.** Med Int Neurol. 2000;10(4):45-51.
11. Janardhan V, Qureshi AI. **Mechanisms of ischemic brain injury.** Curr Cardiol Rep. 2004;6(2):117-23.
12. Kuhl CK, Textor J, Gieseke J, von Falkenhausen M, Gernert S, Urbach H, et al. **Acute and subacute ischemic stroke at high-field-strength (3.0-T) diffusion-weighted MR imaging: intraindividual comparative study.** Radiology. 2005;234(2):509-16.
13. Bhalla D, Marin B, Preux PM. **Stroke profile in Afghanistan and Nepal.** Neurol Asia. 2009;14:87-94.
14. Mumtaz AM, Muhammad U, Muhammad H. **Stroke**

and its relationship to risk factors. Gomal Journal of Medical Sciences. 2009;7(1).

15. Krishna CD, Suman BT, Sharmila M. **Retrospective analysis of stork and its risk factors at Nepal Medical College Teaching Hospital.** NMCJ. 2006.

16. Efstathiou S, Tsioulos D, Zacharos I, Tsiakou A, Mitromaras A, Mastorantonakis S, et al. **A new classification tool for clinical differentiation between haemorrhagic and ischaemic stroke.** Journal of internal medicine. 2002;252(2):121-9.

17. Olindo S, Cabre P, Deschamps R, Chatot-Henry C, Rene-Corail P, Fournerie P, et al. **Acute Stroke in the Very Elderly Epidemiological Features, Stroke Subtypes, Management, and Outcome in Martinique, French West Indies.** Stroke. 2003;34(7):1593-7.

18. Tilling K, Sterne JA, Rudd AG, Glass TA, Wityk RJ, Wolfe CD. **A new method for predicting recovery after stroke. Stroke.** 2001;32(12):2867-73.

19. Thijs VN, Lansberg MG, Beaulieu C, Marks MP, Moseley ME, Albers GW. **Is early ischemic lesion volume on diffusion-weighted imaging an independent predictor of stroke outcome?** A multivariable analysis. Stroke. 2000;31(11):2597-602.

20. Vauthey C, De Freitas G, Van Melle G, Devuyst G, Bogousslavsky J. **Better outcome after stroke with higher serum cholesterol levels.** Neurology. 2000;54(10):1944-9.

21. Jimenez-Conde J, Biffi A, Rahman R, Kanakis A, Butler C, Sonni S, et al. **Hyperlipidemia and reduced white matter hyperintensity volume in patients with ischemic stroke.** Stroke. 2010;41(3):437-4.

22. Tramer F, Rocco F, Micali F, Sandri G, Panfili E. **Antioxidant systems in rat epididymal spermatozoa.** Biology of reproduction. 1998;59(4):753-8.

23. Stachon A, Böning A, Weisser H, Laczkovics A, Skipka G, Krieg M. **Prognostic significance of low serum cholesterol after cardiothoracic surgery.** Clinical chemistry. 2000;46(8):1114-20.

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"Innovation distinguishes between a leader and a follower."

Steve Jobs

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