The Professional Medical Journal
www.theprofesional.com

DOI: 10.29309/TPMJ/2019.26.02.3121

ORIGINAL PROF-0-3121

ISCHEMIC STROKE;

ASSOCIATION OF RAISED LOW DENSITY LIPOPROTEIN LEVELS WITH VARIOUS RISK FACTORS OF ISCHEMIC STROKE AT A TERTIARY CARE HOSPITAL.

Shahzad Alam Khan[1], Nasir Jamal Khan[2], Ikram Fareed Langrial[3], Saima Ashraf[4], Iqra Imtiaz[5]

1. MBBS, FCPS
Assistant Professor
Department of Medicine
Nishtar Medical University, Multan.
2. MBBS, FCPS
Assistant Professor
Department of Medicine
Nishtar Medical University, Multan.
3. MBBS, FCPS
Assistant Professor
Department of Cardiology
CPEIC Multan.
4. MBBS, FCPS
Assistant Professor
Department of Gynae & Obs.
NMU, Multan.
4. MBBS
House officer
NMU, Multan.

Correspondence Address:
Dr. Shahzad Alam Khan
Assistant Professor
Department of Medicine
Nishtar Medical University, Multan.
shahzadalam17735@gmail.com

Article received on:
24/07/2018
Accepted for publication:
05/12/2018
Received after proof reading:
31/01/2019

ABSTRACT… Objectives: To establish the association of raised LDL levels with various risk factors causing cerebral ischemia in stroke patients. **Background:** Cerebrovascular accident (CVA) is a health concern worldwide. It causes enormous disabilities in adult age group, and is 2nd commonest cause of deaths throughout the world. It has been established that approximately 15 million people succumb to stroke each year worldwide, out of this 5 million don't survive and another 5 million become permanently handicapped and thus put significant burden on catering families. This study was conducted to identify contribution of different risk factors in causing ischemic stroke in our population. **Study Design:** Descriptive, purposive case series study. **Setting:** Medical Unit-IV, Nishtar Medical College/Hospital, Multan. **Period:** One Year tenure spread between January 2017 to December 2017. **Material and Methods:** 205 cases between 40-70 years of age including both male and female patients with ischemic stroke, irrespective of disease duration were included in study. History of raised BP, previous stroke, history of stroke in family, diabetes and smoking was recorded on pre-designed questionnaire. Body mass index was calculated after noting weight and height of the patient. Venous blood (5 ml) sample was drawn and sent to the pathology laboratory of Nishtar Hospital Multan for estimation of serum LDL level and blood glucose level. **Results:** Of these 205 study cases, 92 (44.9%) patients were male while 113 (55.1%) patients were female. Mean age of patients in our setting was noted to 51.58 ± 8.05 years. In our study, 50 (24.4%) patients were smokers and 40 (19.5%) had history of hypertension. In our setting, family history of stroke was present in 39 (19%) and previous history of stroke was found in 31 (15.1%). Mean body mass index of our patients was calculated to be 23.17± 2.85 kg/m^2 and 30(14.6%) cases were obese in our study. Mean fasting blood glucose level was 118.32 ± 23.21 mg/dl (48 (23.4%) had diabetes). Mean low density lipoprotein level (LDL) noted in our study was 109.59 ± 49.15 mg/dl and raised level of LDL was seen in 88 (42.9%) of our study cases. **Conclusion:** By identifying the share of various risk factors contributing in ischemic stroke, we can target population at risk of ischemic stroke and strict control and regulation of modifiable risk factors we can prevent this ominous condition to occur. Our study results point towards early diagnosis which will ultimately lead to proper management to improve clinical outcome in such patients. Raised levels of LDL were significantly associated with gender, diabetes, hypertension, obesity, family history and previous history of stroke.

Key words: Ischemic Stroke, Low Density Lipoprotein, Frequency.

Article Citation: Khan SA, Khan NJ, Langrial IF, Ashraf S, Imtiaz I. Association of raised low density lipoprotein levels with various risk factors of ischemic stroke at a tertiary care hospital. Professional Med J 2019; 26(2):344-349.
DOI: 10.29309/TPMJ/2019.26.02.3121

INTRODUCTION

Cerebrovascular accident is an alarming health issue which is one of commonest cause of adult disability and the second largest factor causing mortality throughout the world.[1] Annually, 15 million people suffer from stroke approximately. It is suggested that number of non fatal stroke is 15 million, out of these about one third of patients become disabled. It puts an enormous burden of functional impairments; with 20% of patients who survive require institutional care for minimum of three months and 15-30% becomes handicapped for the rest of life. It puts enormous load on the stricken families and community, especially in the third world countries.[2] According to an estimate of the World Health Organization (WHO), by the year 2020 CVA will still be the 2nd largest cause of death along with coronary

heart disease both in underdeveloped as well as affluent countries.[3] In addition, patients having stroke in underdeveloped territories are 10 years younger than those we see in western countries and hence the brunt of functional incapacity in survivors is very high.[4]

Cerebral infarction (Ischemic Stroke) occurs due to occlusion of blood vessel carrying blood to the brain tissue. It is responsible for 60-90% of all CVA cases in Pakistan.

The factors which contribute to ischemic stroke are divided as non-modifiable (gender, age, prior stroke, family history, and ethnicity) and modifiable risk factors (diabetes mellitus, hypertension, arterial fibrillation, dyslipidemia, coronary artery disease, smoking, physical inactivity, obesity, alcohol abuse.[5-10]

The raised LDL levels have also previously been reported to be associated with higher proportions of ischemic stroke in different population subsets, however their role with different risk factors have not been properly addressed. So this study was conducted to establish the role of different risk factors of ischemic stroke with raised LDL level in our local population of Southern Punjab.

MATERIAL AND METHODS

Study Design
Descriptive, Cross-sectional study.

Setting
Medical Unit-IV, Nishtar Hospital Multan.

Duration of Study
One Year from January 2017 to December 2017.

Sample Size
Sample size is 205 cases.

Sampling Technique
Non probability, consecutive sampling.

Inclusion Criteria
1. Age; 40-70 years.
2. Gender; both male and female patients.
3. Patients with ischemic stroke, irrespective of disease duration (as defined in operational definitions).

Exclusion Criteria
1. Patients with intracerebral hemorrhage, subarachnoid hemorrhage or intra/extradural hematoma(on CT scan)
2. Patients with ischemic heart disease and low ejection fraction.
3. Previously diagnosed cases of brain tumors (with history and medical record).

OPERATIONAL DEFINITION

Obesity
Was defined as BMI more than 30 kg/m^2

Hypertension
Known patients of hypertension taking or advised antihypertensive medication for more than 2 years.

Diabetes
Fasting glucose > 126 mg/dl on two different occasions 24 hours apart or already known diabetics taking oral hypoglycemic drugs/insulin for more than 2 years.

Raised LDL
Serum fasting LDL levels ≥ 100 mg/dl.

Data Collection Procedure
A proforma was devised to note the findings of the patients. All the patients having ischemic stroke (205), meeting inclusion criteria were enrolled from Medical Unit-IV, Department of Medicine Nishtar Hospital Multan. After taking informed consent from each patient/attendant, that case was included in this study and was properly informed about objectives of this study. Venous blood (5 ml) sample was drawn and analysed in pathology laboratory of Nishtar Hospital Multan for the serum LDL level and blood glucose level estimation (FBS). Raised serum LDL level, diabetes, history of hypertension, smoking were recorded on pre-designed questionnaire. Data was processed and analyzed by SPSS-20. Descriptive statistics were used or the calculation mean and standard deviation for the patients age, height, weight, blood sugar level, LDL

levels and BMI. Frequencies were estimated for categorical variables like raised LDL level (Yes/No), gender, age groups, family history of stroke, diabetes, smoking history of hypertension, and previous history of strokes. Chi-square test has been applied to establish the role of different risk factors of stroke with raised serum LDL levels at level of significance of 0.05 with 95 % confidence level.

RESULTS

In our study, 205 patients having ischemic stroke were included in study. Among 205 cases, 92 (44.9%) were male and 113 (55.1%) were female. In our study, mean age of our patients was noted to be 51.58 ± 8.05 years, youngest patient age was 40 years while eldest was 70 years old. Mean fasting blood glucose level was 118.32 ± 23.21 mg/dl and 48 (23.4%) had diabetes. Out of 205 patients, 30 (14.6%) were obese and mean body mass index of our patients was found to be 23.17± 2.85 kg/m^2. History of smoking was present in 50 (24.4%) patients and 40 (19.5%) had history of hypertension. Family history of stroke was present in 39 (19%) of our study cases while previous history of stroke was noted in 31 (15.1%) of our study cases. Mean low density lipoprotein level (LDL) noted in our study was 109.59 ± 49.15 mg/dl and raised level of LDL was seen in 88 (42.9%) of our case population. The role various risk factors of ischemic stroke with deranged LDL levels have been given in Table-I to VI.

Gender	Raised LDL		P-Value
	Yes (n = 88)	No (n = 117)	
Male (n = 92)	50	42	0.004
Female (n = 113)	38	75	
Total	205		

Table-I. Stratification of raised low density lipoprotein levels (LDL) with regards to gender. (n = 205)

Diabetes	Raised LDL		P – value
	Yes (n = 88)	No (n = 117)	
Yes (n = 48)	39	09	0.000
No (n = 157)	49	108	
Total	205		

Table-II. Stratification of raised low density lipoprotein levels (LDL) with regards to diabetes. (n = 205)

Obesity	Raised LDL		P – value
	Yes (n = 88)	No (n = 117)	
Yes (n = 30)	20	10	0.005
No (n = 175)	68	107	
Total	205		

Table-III. Stratification of raised low density lipoprotein levels (LDL) with regards to obesity. (n = 205)

Hypertension	Raised LDL		P – value
	Yes (n = 88)	No (n = 117)	
Yes (n = 40)	30	10	0.000
No (n = 165)	58	107	
Total	205		

Table-IV. Stratification of raised low density lipoprotein levels (LDL) with regards to hypertension. (n = 205)

Family History	Raised LDL		P – value
	Yes (n = 88)	No (n = 117)	
Yes (n = 39)	39	00	0.000
No (n = 166)	49	117	
Total	205		

Table-V. Stratification of raised low density lipoprotein levels (LDL) with regards to family history. (n = 205)

Previous History	Raised LDL		P – value
	Yes (n = 88)	No (n = 117)	
Yes (n = 31)	31	00	0.000
No (n = 174)	57	117	
Total	205		

Table-VI. Stratification of raised low density lipoprotein levels (LDL) with regards to previous history of stroke. (n = 205)

DISCUSSION

Cerebrovascular accident is a major contributory factor in causing death worldwide. Stroke remains the second largest cause of mortality and morbidity in the world[11,12] in spite of major advancements made in stroke prevention, nursing care, and rehabilitation in recent past. However, key to the success lies in the identification and confinement of all significant causal and modifiable risk factors.[8]

The study was conducted to identify relation of controllable risk factors such as diabetes mellitus,

hypertension, and smoking with ischemic stroke.

In our study, a total of 205 patients with ischemic stroke meeting inclusion criteria were included. Among 205 patients, 92 (44.9%) patients were male and 113 (55.1%) were female. Sadreddini et al[13] also reported 54 % female gender predominance among patients with ischemic stroke from Iran. These findings are identical to that what we saw in our case. Abid et al[7] and Sacco et al[14] reported that prevalence of ischemic stroke in females is 52 % and 55 % respectively which is almost the same as we noticed. In our settings, mean age of patients was 51.58 ± 8.05 years. We also noticed that most of our patients i.e. 116 (56.6%) were elderly with age more than 50 years. Khan et al[15] had similar finding regarding mean age i.e. 58.11 ± 15.29 which is quite near to our results.

Abid et al[7] found 55.96 ± 13.75 years as mean age of the patients who presented with cerebral ischemia which closely matches that of our study results. In our settings, 48 (23.4%) had diabetes, 30 (14.6%) were obese, 50 (24.4%) were smokers and 40 (19.5%) had history of hypertension. Sadreddini et al[13] reported from Iran that patients with ischemic stroke presented with diabetes in 24 % patients, hypertension in 78 % patients and smoking in 20 %. Our results are partially in compliance with that of Sadreddini et al[13] from Iran. Khan NI et al[16] also reported obesity in 18 %, diabetes in 36.6% and smoking in 32 % patients with ischemic stroke. These results are in accordance with our study results. Family history of stroke was present in 39 (19%) of our cases while previous history of stroke was noted in 31 (15.1%) of our study cases. Sadreddini et al[13] from Iran reported 18 % previous history of stroke which is close to our study results.

Mean low density lipoprotein level (LDL) noted in our study was 109.59 ± 49.15 mg/dl and raised level of LDL was seen in 88 (42.9%) of our study cases. Jehangir et al[17] also reported mean LDL levels to be 127.21 ±34.31 mg/dl among patients having ischemic stroke. Anwar et al[18] reported mean LDL levels to be 137.21 ± 38.21 mg/dl which is near to our study results. Sadreddini et al[13] from Iran reported similar results. A study carried out by Mahmood et al[19] showed 7 % raised LDL levels in patients having ischemic stroke which is comparatively lower than that reported in our study. While another study by Smith et al[20] reported 52.1 % raised LDL levels which is close to our study results. A study from Jamshoro by Kumar et al[21] noticed 37 % raised LDL levels which is close to our study results.

Stratification against gender showed a significant predilection of raised LDL cholesterol in male patients with ischemic stroke. However when stratified against age, no significant difference was seen in patients below 50 or above 50 years. Diabetes, Hypertension, obesity, family history and previous history of stroke were significantly associated with raised LDL levels. Tsukinoki et al[22] from Japan also reported significant association of diabetes, hypertension and obesity with raised LDL levels among stroke patients, similar to that of our results.

CONCLUSION

By identifying the share of various risk factors contributing in ischemic stroke, we can target population at risk of ischemic stroke and by strict control and regulation of modifiable risk factors we can prevent this ominous condition to occur. Our study results point towards early diagnosis which will ultimately lead to proper management to improve clinical outcome in such patients. Raised levels of LDL were significantly associated with gender, diabetes, hypertension, obesity, family history and previous history of stroke.

REFERNCES

1. Khan NI, Naz L, Mushtaq S, Rukh L, Ali S, Hussain Z. **Ischemic stroke: Prevalence of modifiable risk factors in male and female patients in Pakistan.** Pak J Pharm Sci 2009; 22(1):62-7.

2. Basharat Z, Mumtaz S, Rashid F, Rashid S, Mallam SA, Diljan A, et al. **Prevalence of risk factors of ischemic stroke in a local Pakistani population.** Neuro Sciences 2012; 17(4):357-62.

3. Khan SF, Zafar A, Malik A. **Stroke in Pakistan: reality, challenges and a call for action.** Pak J Neurol Sci 2008; 3:14-9.

4. Feigin VL. **Stroke in developing countries: can the epidemic be stopped and outcomes improved?** Lancet Neurol 2007; 6(2):94-7.

5. Okokhere PO, Bankole IA, Erohubie CA. **Characteristics, risk factors, and case fatality rate of stroke in hospitalized patients in semi-urban South Nigeria.** SAGE Open Medicine 2013; doi:10.1177/2050312113516112.

6. Zahra F, Kidwai SS, Siddiqi SA, Khan RM. **Frequency of newly diagnosed diabetes mellitus in acute ischaemic stroke patients.** J Coll Physician Surg Pak. 2012; 22(4):226-9.

7. Abid N, Khan SA, Taseer IH. **Frequency of hyperlipidemia in patients presenting with ischemic stroke** Pak J Med Health Sci. 2012; 6(2):423-7.

8. Khealani BA, Syed NA, Maken S, Mapari UU, Hameed B, Ali S, et al. **Predictors of ischemic versus hemorrhagic stroke in hypertensive patients.** J Coll Physician Surg Pak. 2005; 15:22-5.

9. Ng WK, Goh KJ, George J. **A comparative study of stroke subtypes between Asian and Caucasians in two hospital- based stroke registries.** Neurol J southeast Asia.1998; 3:19-26. 6. Mayer SA. Ultra-early hemostatic therapy for intracerebral hemorrhage. Stroke.2003; 34:224-9.

10. Hameed B, Khealani BA, Mozzafar T. **Prognostic indicators in patients with primary intraventricular.** Professional Med J 2014; 21(6): 1204-1208 www. theprofessional.com Hemorrhagic Stroke 1208 hemorrhage. J Pak Med Assoc Aug. 2005; 55(8):315-7.

11. Cheung RT. **Cerebrovascular disease: Advances in management.** Hong Kong Med J. 2001; 7:58–66.

12. Ariesen MJ, Clau SP, Rinkel GJ, Algra A. **Risk factor for intracranial hemorrhage in general population:** A systematic review.

13. Sadreddini SA, Abolfathi AA, Khandaghi R, Talebi M, Lakian A. **C-Reactive protein, fibrinogen, LP (a), lipid profile levels and platelet count in patients with ischemic stroke.** Pak J Neurological Sci. 2006; 1(1):7-13.

14. Sacco RL[1], Benson RT, Kargman DE, Boden-Albala B, Tuck C, Lin IF, et al. **High-density lipoprotein cholesterol and ischemic stroke in the elderly: The Northern Manhattan Stroke Study.** JAMA. 2001 Jun 6; 285(21):2729-35.

15. Khan MN, Khan HD, Ahmad M, Umair M. **Serum total and HDL-cholesterol in ischemic and hemorrhagic stroke.** Ann Pak Inst Med Sci 2014; 10(1)22-26.

16. Khan NI, Naz L, Mushtaq S, Rukh L, Ali S, Hussain Z. **Ischemic stroke: prevalence of modifiable risk factors in male and female patients in Pakistan.** Pak J Pharm Sci. 2009; 22(1):62-7.

17. Jehangir MS, Khan IM, Khan DM, Ather CAA, Mahmood B, Jehangir MM. **Frequency of ischemic and hemorrhagic stroke and comparison of low density lipoprotein in these patients.** Pak J Med Health Sci. 2015; 9(3):838-41.

18. Anwar A, Hafeez S, Ahmed R. **Comparison of low density lipoprotein in patients with ischemic and hemorrhagic stroke.** Pak J Med Health Sci. 2015; 9(4):1378-80.

19. Mahmood A, Sharif MA, Khan MN, Ali UZ. **Comparison of serum lipid profile in ischaemic and haemorrhagic stroke.** J Coll Physicians Surg Pak May - May 2010; 20(5):317-20.

20. Smith EE, Pan W, Olson D, Reeves MJ, Ovbiagele B, Peterson ED, et al. **Frequency and determinants of lipid testing in ischemic stroke and transient ischemic attack: Findings from get with the guidelines-stroke.** Stroke. 2010; 41(2):232-8.

21. Kumar R, Shah MI, Lakhair MA, Memon Z. **Ischemic stroke; Frequency of dyslipidemia and other risk factors at Tertiary Care hospital Hyderabad/ Jamshoro.** Professional Med J 2016; 23(8):925-931.

22. Tsukinoki R[1], Okamura T[2], Watanabe M[3], Kokubo Y[4], Higashiyama A[5], Nishimura K[6], et al. **Blood pressure, low-density lipoprotein cholesterol, and incidences of coronary artery disease and ischemic stroke in Japanese: The Suita study.** Am J Hypertens. 2014 Nov; 27(11):1362-9.

Your **attitude,**
not your **aptitude,**
will determine your **altitude.**

"Zig Ziglar"

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Shahzad Alam Khan	Conception, Planning of study, Data collection.	
2	Nasir Jamal Khan	Data collection.	
3	Ikram Fareed Langrial	Data analysis.	
4	Saima Ashraf	Data analysis, Proof reading.	
5	Iqra Imtiaz	Data collection, coordination.	