Cholesterol as a spontaneous intracerebral hemorrhage risk factor

The aim of a study was to evaluate the association between ICH (Intracerebral hemorrhage) and cholesterol level as well as to find out the risk of total cholesterol (TC), Triglyceride (TG), High-density lipoprotein (HDL), and Low-density lipoprotein (LDL) for the disease. This was a case-control retrospective study with 60 cases and 60 controls. The study place was in the Neurosurgery department of Sylhet Women's Medical College Hospital and the study period was 2 years (from January 2020 to December 2021). The mean age ±SD of the cases was 57.08±9.47 years and the highest number of participants was in the 51-60 year group. The commonest location of ICH was deep (67.0%) followed by intraventricular hemorrhage (IVH) (28.3%) and lobar (5.0%). The means of TC ($p=0.0004$), TG ($p=0.00013$), and LDL ($p<0.00001$) were significantly lower than those of the control group. The mean HDL (36.48) of cases was significantly ($p=0.00003$) higher than the mean HDL (28.9) of controls. TC participants had 52.0% less risk to develop ICH. Raised TG had 46.0% and raised LDL had a 52.0% lower risk of ICH [1)]

Chang Wong E, Chang Chui H. Vascular Cognitive Impairment and Dementia. Continuum (Minneap Minn). 2022 Jun 1;28(3):750-780. doi: 10.1212/CON.0000000000001124. PMID: 35678401.

3: Kittner SJ, Sekar P, Comeau ME, Anderson CD, Parikh GY, Tavarez T, Flaherty ML, Testai FD, Frankel MR, James ML, Sung G, Elkind MSV, Worrall BB, Kidwell CS, Gonzales NR, Koch S, Hall CE, Birnbaum L, Mayson D, Coull B, Malkoff MD, Sheth KN, McCauley JL, Osborne J, Morgan M, Gilkerson LA, Behymer TP, Demel SL, Moomaw CJ, Rosand J, Langefeld CD, Woo D. Ethnic and Racial Variation in Intracerebral Hemorrhage Risk Factors and Risk Factor Burden. JAMA Netw Open. 2021 Aug 2;4(8):e2121921. doi: 10.1001/jamanetworkopen.2021.21921. PMID: 34424302; PMCID: PMC8383133.

4: Liu Q, Zhao W, Zou X, Xing Y, Zhou G, Li X. Sex Differences in Outcomes After Spontaneous Intracerebral Hemorrhage Among Patients With Low Total Cholesterol Levels. Am J Med Sci. 2021 Nov;362(5):462-471. doi: 10.1016/j.amjms.2021.05.007. Epub 2021 May 14. PMID: 33992602.

5: Xiong M, Wang S, Zhang Y, Liu J, Chen L, Zou X, Li Y, Zhang L. Influential factors for large volume of spontaneous supratentorial intracerebral hemorrhage. Zhong Nan Da Xue Xue Bao Yi Xue Ban. 2020 Dec 28;45(12):1398-1402. English, Chinese. doi: 10.11817/j.issn.1672-7347.2020.190614. PMID: 33472994.

6: Liu Q, Zhao W, Xing Y, Hong Y, Zhou G. Low Triglyceride Levels are Associated with Unfavorable Outcomes in Patients with Spontaneous Intracerebral Hemorrhage. Neurocrit Care. 2021 Feb;34(1):218-226. doi: 10.1007/s12028-020-01023-0. PMID: 32557109.

7: Cai B, Peng L, Wang ZB, Zhang M, Peng B. Association between Serum Lipid and Hematoma Expansion after Spontaneous Intracerebral Hemorrhage in Chinese Patients. J Stroke Cerebrovasc Dis. 2020 Jun;29(6):104793. doi: 10.1016/j.jstrokecerebrovasdis.2020.104793. Epub 2020 Mar 27. PMID: 32224203.

8: Elkhatib THM, Shehta N, Bessar AA. Hematoma Expansion Predictors: Laboratory and Radiological Risk Factors in Patients with Acute Intracerebral Hemorrhage: A Prospective Observational Study. J Stroke Cerebrovasc Dis. 2019 Aug;28(8):2177-2186. doi: 10.1016/j.jstrokecerebrovasdis.2019.04.038.

Epub 2019 May 24. PMID: 31133486.

9: Falcone GJ, Gurol ME. Cholesterol levels, statins, and spontaneous intracerebral hemorrhage: An interesting but complicated story. Neurology. 2018 Jul 31;91(5):197-198. doi: 10.1212/WNL.0000000000005898. Epub 2018 Jul 3. PMID: 29970403.

10: Chang JJ, Katsanos AH, Khorchid Y, Dillard K, Kerro A, Burgess LG, Goyal N, Alexandrov AW, Alexandrov AV, Tsivgoulis G. Higher low-density lipoprotein cholesterol levels are associated with decreased mortality in patients with intracerebral hemorrhage. Atherosclerosis. 2018 Feb;269:14-20. doi: 10.1016/j.atherosclerosis.2017.12.008. Epub 2017 Dec 6. PMID: 29253643.

11: Ma H, Guo ZN, Sun X, Liu J, Lv S, Zhao L, Guo W, Jin H, Yang Y. Hematoma volume is a predictive factor of disturbed autoregulation after spontaneous intracerebral hemorrhage. J Neurol Sci. 2017 Nov 15;382:96-100. doi: 10.1016/j.jns.2017.09.035. Epub 2017 Sep 28. PMID: 29111029.

12: Scutt P, Blackburn D, Krishnan K, Ballard C, Burns A, Ford GA, Mant J, Passmore P, Pocock S, Reckless J, Sprigg N, Stewart R, Wardlaw JM, Bath PM. Baseline characteristics, analysis plan and report on feasibility for the Prevention Of Decline in Cognition After Stroke Trial (PODCAST). Trials. 2015 Nov 7;16:509. doi: 10.1186/s13063-015-1033-2. PMID: 26545986; PMCID: PMC4636808.

13: Tran-Dinh A, Levoye A, Lambert G, Louedec L, Journé C, Meilhac O, Amarenco P. Low levels of low-density lipoprotein-C associated with proprotein convertase subtilisin kexin 9 inhibition do not increase the risk of hemorrhagic transformation. Stroke. 2014 Oct;45(10):3086-8. doi: 10.1161/STROKEAHA.114.005958. Epub 2014 Aug 14. PMID: 25123222.

14: Tapia-Pérez JH, Rupa R, Zilke R, Gehring S, Voellger B, Schneider T. Continued statin therapy could improve the outcome after spontaneous intracerebral hemorrhage. Neurosurg Rev. 2013 Apr;36(2):279-87; discussion 287. doi: 10.1007/s10143-012-0431-0. Epub 2012 Oct 25. PMID: 23097148.

15: Haussen DC, Henninger N, Kumar S, Selim M. Statin use and microbleeds in patients with spontaneous intracerebral hemorrhage. Stroke. 2012 Oct;43(10):2677-81. doi: 10.1161/STROKEAHA.112.657486. Epub 2012 Jul 24. PMID: 22829545.

16: Chen YC, Chen CM, Liu JL, Chen ST, Cheng ML, Chiu DT. Oxidative markers in spontaneous intracerebral hemorrhage: leukocyte 8-hydroxy-2'-deoxyguanosine as an independent predictor of the 30-day outcome. J Neurosurg. 2011 Dec;115(6):1184-90. doi: 10.3171/2011.7.JNS11718. Epub 2011 Aug 26. PMID: 21962000.

17: Arboix A, García-Eroles L, Oliveres M, Targa C, Balcells M, Massons J. Pretreatment with statins improves early outcome in patients with first-ever ischaemic stroke: a pleiotropic effect of statins or a beneficial effect of hypercholesterolemia? BMC Neurol. 2010 Jun 18;10:47. doi: 10.1186/1471-2377-10-47. PMID: 20565890; PMCID: PMC2905355.

18: Terruso V, D'Amelio M, Di Benedetto N, Lupo I, Saia V, Famoso G, Mazzola MA, Aridon P, Sarno C, Ragonese P, Savettieri G. Frequency and determinants for hemorrhagic transformation of cerebral infarction. Neuroepidemiology. 2009;33(3):261-5. doi: 10.1159/000229781. Epub 2009 Jul 27. PMID: 19641332.

19: Chen CM, Chen YC, Wu YR, Hu FJ, Lyu RK, Chang HS, Ro LS, Hsu WC, Chen ST, Lee-Chen GJ. Angiotensin-converting enzyme polymorphisms and risk of spontaneous deep intracranial hemorrhage in Taiwan. Eur J Neurol. 2008 Nov;15(11):1206-11. doi: 10.1111/j.1468-1331.2008.02294.x. Epub

2008 Aug 27. PMID: 18754764.

20: Roquer J, Rodríguez Campello A, Gomis M, Ois A, Munteis E, Böhm P. Serum lipid levels and in-Hospital mortality in patients with intracerebral hemorrhage. Neurology. 2005 Oct 25;65(8):1198-202. doi: 10.1212/01.wnl.0000180968.26242.4a. PMID: 16247046.

21: Grotta JC. Management of Primary Hypertensive Hemorrhage of the Brain. Curr Treat Options Neurol. 2004 Nov;6(6):435-442. doi: 10.1007/s11940-004-0001-z. PMID: 15461921.

22: Zhou JF, Wang JY, Luo YE, Chen HH. Influence of hypertension, lipometabolism disorders, obesity and other lifestyles on spontaneous intracerebral hemorrhage. Biomed Environ Sci. 2003 Sep;16(3):295-303. PMID: 14631835.

23: Karibe H, Niizuma H, Ohyama H, Shirane R, Yoshimoto T. Hepatitis C virus (HCV) infection as a risk factor for spontaneous intracerebral hemorrhage: hospital based case-control study. J Clin Neurosci. 2001 Sep;8(5):423-5. doi: 10.1054/jocn.2001.0811. PMID: 11535009.

24: Grønholdt ML. Ultrasound and lipoproteins as predictors of lipid-rich, rupture-prone plaques in the carotid artery. Arterioscler Thromb Vasc Biol. 1999 Jan;19(1):2-13. doi: 10.1161/01.atv.19.1.2. PMID: 9888860.

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Talha KA, Selina F, Patwary MI, Khan MH, Debnath J, Erica KT, Momo FR. Relationship between Cholesterol Level and Spontaneous Intracerebral Hemorrhage: A Case-Control Study in Bangladesh. Mymensingh Med J. 2022 Oct;31(4):1115-1120. PMID: 36189560.