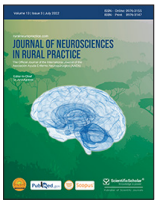
ScientificScholar®
Knowledge is power
Publisher of Scientific Journals

https://ruralneuropractice.com

Journal of Neurosciences in Rural Practice



Original Article

Cognition and cardiovascular comorbidities among older adults in primary care in West India

Vikas Dhikav[1], Bhargavi Jadeja[1], Pooja Gupta[1]

[1]Department of Health Research, Indian Council of Medical Research-National Institute for Implementation Research on Non-Communicable Diseases, Jodhpur, Rajasthan, India.

ABSTRACT

Objectives: Cardiovascular risk factors (e.g., diabetes and hypertension) are comorbidities associated with cognitive impairment. The present study was planned to study the relationship between cardiovascular risk factors and cognitive impairment using General Practitioner assessment of Cognition (GPCOG) scale, which is easy to use scale in the primary care.

Materials and Methods: A total of 350 older adults (mean age=66.71 ± 6.53 years; M:F = 220:130) among 3000 who reported to the primary care center in West India were screened. Cardiovascular risk factors were assessed based on written medical records. GPCOG was used for cognitive screening of those over the age of 60 with subjective memory complaints.

Results: Frequency of cardiovascular (CV) risk factors in those with cognitive impairment was 46.2% (n = 162/350) and 29% (101/350) in those without cognitive impairment. A Chi-square test of proportion showed values to be statistically significantly different (Chi-square value = 22.04; P =< 0.001; 95% confidence interval [CI] = 10.0463–24.1076%). Odds ratio was found to be 1.6 (95% CI =2–2.1; P =< 0.05).

Conclusion: A higher CV risk factors were observed among those with cognitive impairment compared to those cognitively normal older adults in the primary care.

Keywords: Cognitive impairment, Cardiovascular risk factors, Dementia, Primary care

INTRODUCTION

Frequency of cardiovascular (CV) risk factors[1] in older adults in those with cognitive impairment has been reported. Most of the data, however, come either from Western countries in this regard.[2,3] There is evidence that CV risk factors may be linked pathophysiologically to the cognitive impairment[4,5] but causal relationship between the two is unclear. General Practitioner assessment of Cognition (GPCOG) is an easy-to-use screening tool for cognitive impairment in community, designed for use by general practitioners, primary care physicians, and family doctors alike. Epidemiological studies have reported that various cardiovascular risk factors such as diabetes and hypertension may be associated with Alzheimer's disease and mild cognitive impairment.[6] Furthermore, cohort studies have investigated relationship among those with embolic stroke or chronic hypoperfusion with increased risk of cognitive impairment and dementia.

Cardiovascular comorbidities and functional cognitive impairments are associated. The present study was done to study the frequency of cognitive impairment and cardiovascular risk factors (e.g., diabetes and hypertension or both) among older adults coming to primary care. Furthermore, it was, further, aimed to assess relationship between the two (if any) which could be demonstrated using a screening tool that is feasible in primary care (e.g., General Practitioners assessment of Cognition – GPCOG).

MATERIALS AND METHODS

Study setting

A cross-sectional survey was conducted among 350 older adults coming to the primary care in West India during the study period (January–July 2021). Those reporting to primary care center for seeking treatment of non-communicable diseases such as diabetes and hypertension or both and had

***Corresponding author:** Vikas Dhikav, Department of Health Research, Indian Council of Medical Research-National Institute for Implementation Research on Non-Communicable Diseases, Jodhpur, Rajasthan, India. vikasdhikav@hotmail.com

Received: 23 September 2022 **Accepted:** 24 September 2022 **EPub Ahead of Print:** 02 January 2023 **Published:** 03 May 2023 **DOI**: 10.25259/JNRP_23_2022

subjective memory complaints who were asked to undergo GPCOG scale screening.

Subject enrolment

Older adults coming to primary health-care center for various health reasons were enumerated but those with subjective memory complaints were enrolled in the study. Those with such complaints were sent for detailed evaluation.

GPCOG

GPCOG is a simple and easy-to-use screening tool for cognitive impairment. It has been designed for use by general practitioners, primary care physicians, and family doctors like.

Ethics

A written and informed consent was taken from all the study participants and study was approved by the Institutional Ethics Committee, ICMR-NIIRNCD, Jodhpur (Rajasthan).

RESULTS

A total of 3000 older adults reported during the study period of January–July 2021; and a total of 350 older adults with subjective memory complaints were asked to undergo GPCOG screening. Demographic, diabetes, and hypertension status data are presented in [Tables 1 and 2].

A higher CV risk factors were observed among those with cognitive impairment compared to those cognitively normal older adults in the primary care in the present study [Tables 1 and 2].

Cardiovascular risk factors frequency in those with cognitive impairment was 46.2% (n = 162/350) and 29% (101/350) in those without cognitive impairment. A Chi-square test showed values to be statistically significantly different (difference = 17.2%; Chi-square value = 22.04; P =< 0.001; 95% confidence interval [CI] = 10.0463–24.1076%). Odds ratio was found to be 1.6 (95% CI = 1.2–2.1; P = < 0.05). Mean duration of diabetes was 9.33 ± 8.45 and hypertension was 9.44 ± 8.33 years, respectively.

Table 1: Demographic and details of those with diabetes and hypertension in the present study (n=162).

Mean age	M:F	Diabetes	Hypertension	Diabetes with hypertension
67.73±6.8	85:77	48	53	37

Table 2: Demographic and frequency of diabetes, hypertension, or both with normal GPCOG scores in the present study (n=188).

Mean age	M:F	Diabetes	Hypertension	Diabetes with hypertension
65.83±6.2	135:53	30	30	22

Not only the value of diabetes and hypertension in both groups (with or without combinative impairment) was statistically different; number of those with diabetes and hypertension together was also different ([e.g., 22/188 in those with normal GPCOG scores vs. 37/162 with abnormal GPCOG scores]; P = 0.0021; Chi-square value = 9.4; 95% CI = 5.44–24.32%).

Comparison of age using mean comparison showed no significant difference between two groups (i.e., those with or without cardiovascular risk factors). However, number of women in the group with risk factors was significantly higher (77 vs. 53; Chi-square value=27.7; P < 0.0001; CI 14–33.19%).

GPCOG scores of those with diabetes and cognitive impairment were 2.68 ± 1.1, while those with normal cognition and without diabetes were 6.59 ± 1.2 (P = < 0.001), suggesting that the presence of diabetes (Mean ± SD= 205.11 ± 77.65 mg/dl) in age-matched subjects made a difference in cognition scores. Furthermore, this was further confirmed using t-test GPCOG score comparison of those without diabetes but was cognitively abnormal (4.84 ± 2.4 vs. 2.27 ± 1.1; P = < 0.0001).

Furthermore, GPCOG scores of those with diabetes and hypertension but with cognitive impairment had no statistically significant difference among themselves (2.68 ± 1.1 vs. 2.73 ± 1.1; P = 0.89), suggesting that both hypertension and diabetes have almost equal potential to cause silent or florid brain damage, leading to cognitive decline.

DISCUSSION

Relationship between impairment of cognition and cardiovascular factors is a complex one and is a topic of ongoing research.[1-5] The present study enrolled a total of 350 older adults with subjective memory complaints coming to the primary care for screening of non-communicable diseases. Patients were assessed with regard to their cognition using GPCOG and vascular risk factors (e.g., diabetes/hypertension or both) were noted using written records. Study reports a high frequency of diabetes and hypertension or both in patients with cognitive impairment (GPCOG scores <5) in the primary care.

The relationship between the cognitive impairment and presence of cardiovascular risk factors is complex and multifactorial. However, it is not clear if they have some role in causing cognitive impairment or not. It looks plausible to assume that due to cognitive impairment, there can be disturbances in adopting healthy lifestyle and/or following proper diet or there may be as yet to be understood factors

playing their roles.[6-9] Hence, it looks likely that they might have potential to aggravate the cognitive impairment in general. Furthermore, it seems possible that they may act as catalyst to accelerate course of cognitive impairment. Studies in this regard have mainly been done in tertiary care hospitals; the present study reflects situation in primary care and increases the external validity of the hypothesis. The presence of cardiovascular risk factors during middle age has been associated with higher risk of cognitive impairment in later life; it has been said that addressing vascular risk factors even in older adults could lower the risk of cognitive impairment.

Reasons behind co-occurrence of association between cognitive impairment[10-12] and non-communicable diseases of cardiovascular type, for example, diabetes, hypertension, or both could be many. First, poor dietary and lifestyle pattern could be associated with cognitive impairment. Second, there could be poor medication adherence associated with cognitive impairment that could have potentially contributed to cognitive decline. Third, there seems to be a reason to believe that like Alzheimer's disease is called as "Type-III" diabetes by many; so looks likely that cognitive decline could potentially trigger insulin resistance helping to trigger or accentuate the cardiovascular risk factors. Diabetes could result in neuronal oxidative stress, interferes in neuronal pathways, leading to cognitive impairment. Alteration in brain structure and resulting effect on cognition is one of the main reasons of putative association between cognitive impairment and cardiovascular risk factors. Cerebrovascular damage due to vascular risk factors could trigger dementia of vascular type, and it is becoming apparent that vascular risk factors also increase the risk of neurodegenerative diseases, for example, Alzheimer's disease.

Several studies have shown that the management of vascular risk factors could possibly contribute to reducing the risk of developing dementia, thus making cardiovascular risk factors as the important targets for dementia prevention. Multiple vascular risk factors are related to the development of Alzheimer's disease in older adults;[3] hence, combined intervention is likely to be beneficial.

Preserved cognition in adult aging brain is affected by neurovascular health of the brain which is known but significant gaps in our understanding of the links between vascular health inside brain and cerebral aging exist.[4] It has been observed that cognitive dysfunction in old age is related to cardiovascular disease. Research at present is ongoing and may be with passage of time we shall know whether Alzheimer's disease will continue to be considered, a neurodegenerative disease or vascular risk factor management may result in primary prevention or not.

Cognitive impairment seen in patients reporting to the primary care can be picked up using a simple tool such as GPCOG.[2] In addition, it is important to know that since GPCOG is a less sensitive instrument for screening of cognitive impairment, but it can be used as an alternative to Mini-Mental State Examination (MMSE). MMSE needs specially trained workforce as opposed to GPCOG which can be used by any health care worker. Moreover, in a busy primary care setting that aspires to offer cognition screening to patients, GPCOG fits the bill as it is less time consuming.

The prevalence of the cardiovascular risk factors is inevitable part of aging and may be overlooked as "normal aging processes." The present study highlights the high frequency of common cardiovascular risk factors in community-dwelling older adults with cognitive impairment screened at community level. If these factors are not controlled, they can get converted into clinical dementia later on. This is because both cognitive impairment and cardiovascular diseases share same risk factors profile. At community level, therefore, addressing modifiable cardiovascular risk factors are important.[13,14] Evidence suggests using statins could be protective in reducing the risk.[15] Considering this, it has been suggested that timely and accurate diagnosis of dementia is important[16] and community engagement has been found to be protective.[17] This is because being non-diabetics have been shown to prevent progress of dementia.[17,18] Due to potential for preventing dementia by modifying risk factors, it has been proposed that modification should be done at the earliest stage.[19] Modifiable risk factors that prevent dementia or slow its progression are a public health priority. Vascular risk factor such as diabetes and hypertension has been found to be important determinant of dementia in Indian patients.[20,21] Berlin manifesto raised this important issue by suggesting factors that could be addressed for dementia control.[22] It is increasingly getting clear that mixed pathology of neurodegeneration and vascular factors need to be addressed.[23] This will break partnership between the two and can help prevent the vascular pathology which is potentially contributing to neurodegeneration as well.[24]

Main strength of the study is that it is the first sufficiently large study to our mind where the subjects with cognitive impairment have been assessed regarding the presence of cardiovascular risk factors (e.g., diabetes, hypertension, or both) and frequency of the same has been compared in those with or without cognitive impairment in the primary care in India.

Although the study compares CV risk factors in those with or without cognitive impairment; it opens an important and larger question related to pathophysiology of cognitive impairment,[25-29] that is, whether the cardiovascular risk factors are causative or coincidental. The study while pointing toward the possible contribution of cardiovascular risk factors toward strengthens the notion of controlling the

risk factors for potential slowing down cognitive impairment. This is important as one of the main challenges in preventing cognitive decline is poor compliance[5,30] to medicines that have potential to prevent dementia, for example, antihypertensives and antidiabetics.

CONCLUSION

Cardiovascular risk factors (e.g. diabetes, hypertension or both) are common co-morbidities associated with cognitive impairment. Relationship has been demonstrated in both tertiary and primary care. It is not clear as to whether the relationship is causal or co-incidental. Knowing that primary dementias are irreversible; important question is whether tackling these risk factors can slowdown already established dementia or prevent dementia from developing or not. Tackling cardiovascular risks can surely provide collateral benefits e.g. prevent heart, brain attacks etc.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Dhikav V, Verma M, Anand K. Is hypertension a predictor of hippocampal atrophy in Alzheimer's disease? Int Psychogeriatr 2009;21:795-6.
2. Dhikav V, Jadeja B, Anand PK. Cardiovascular risk factors among older adults with cognitive impairment in primary care. Int Psychogeriatr 2021;33:837-8.
3. Dhikav V, Sethi M, Anand KS. Mild cognitive impairment in Parkinson's disease and vascular risk factors among Indian patients. Int Psychogeriatr 2015;27:2098-9.
4. Dhikav V, Anand KS. Are vascular factors linked to the development of hippocampal atrophy in Alzheimer's disease? J Alzheimers Dis 2012;32:711-8.
5. Dhikav V, Singh P, Anand KS. Medication adherence survey of drugs useful in prevention of dementia of Alzheimer's type among Indian patients. Int Psychogeriatr 2013;25:1409-13.
6. Cechetto DF, Hachinski V, Whitehead SN. Vascular risk factors and Alzheimer's disease. Expert Rev Neurother 2008;8:743-50.
7. Hasnain M, Vieweg WV. Possible role of vascular risk factors in Alzheimer's disease and vascular dementia. Curr Pharm Des 2014;20:6007-13.
8. Stewart RA, Held C, Krug-Gourley S, Waterworth D, Stebbins A, Chiswell K, *et al*. Cardiovascular and lifestyle risk factors and cognitive function in patients with stable coronary heart disease. J Am Heart Assoc 2019;8:e010641.
9. De la Monte SM, Wands JR. Alzheimer's disease is Type-3 diabetes: Evidence reviewed. J Diabetes Sci Technol 2008;2:1101-13.
10. Leritz EC, McGlinchey RE, Kellison I, Rudolph JL, Milberg WP. Cardiovascular disease risk factors and cognition in the elderly. Curr Cardiovasc Risk Rep 2011;5:407-12.
11. Johansen MC, Langton-Frost N, Gottesman RF. Role of cardiovascular disease in cognitive impairment. Curr Geri Rep 2020;9:1-9.
12. Adams ML, Grandpre J, Katz DL, Shenson D, Cognitive impairment and cardiovascular disease: A comparison of risk factors, disability, quality of life, and access to health care. Public Health Rep 2020;135:132-40.
13. Song R, Xu H, Dintica CS, Pan KY, Qi X, Buchman AS, *et al*. Associations between cardiovascular risk, structural brain changes, and cognitive decline. J Am Coll Cardiol 2020;75:2525-34.
14. Serrano-Pozo A, Growdon JH. Is Alzheimer's disease risk modifiable? J Alzheimers Dis 2019;67:795-819.
15. Zhang X, Wen J, Zhang Z. Statins use and risk of dementia: A dose-response meta analysis. Medicine (Baltimore) 2018;97:e11304.
16. Liss JL, Seleri Assunção S, Cummings J, Atri A, Geldmacher DS, Candela SF, *et al*. Practical recommendations for timely, accurate diagnosis of symptomatic Alzheimer's disease (MCI and dementia) in primary care: A review and synthesis. J Intern Med 2021;290:310-34.
17. Biessels GJ, Despa F. Cognitive decline and dementia in diabetes mellitus: Mechanisms and clinical implications. Nat Rev Endocrinol 2018;14:591-604.
18. Hu C, Wang L, Guo Y, Cao Z, Lu Y, Qin H. Study of the risk and preventive factors for progress of mild cognitive impairment to dementia. Am J Alzheimers Dis Other Demen 2020;35:1-7.
19. Srisuwan P. Primary prevention of dementia: Focus on modifiable risk factors. J Med Assoc Thai 2013;96:251-8.
20. Tripathi M, Vibha D, Gupta P, Bhatia R, Srivastava MV, Vivekanandhan S, *et al*. Risk factors of dementia in North India: A case-control study. Aging Ment Health 2012;16 :228-35.
21. Gurukartick J, Dongre AR, Shah D. Social determinants of dementia and caregivers' perspectives in the field practice villages of rural health training centre, Thiruvennainallur. Indian J Palliat Care 2016;22:25-32.
22. Hachinski V, Einhäupl K, Ganten D, Alladi S, Brayne C, Stephan BC, *et al*. Preventing dementia by preventing stroke: The Berlin manifesto. Alzheimers Dement 2019;15:961-84.
23. Hachinski V. Dementia: New vistas and opportunities. Neurol Sci 2019;40:763-7.
24. Nucera A, Hachinski V. Cerebrovascular and Alzheimer disease: Fellow travelers or partners in crime? J Neurochem 2018;144:513-6.
25. Zlokovic BV, Gottesman RF, Bernstein KE, Seshadri S, McKee A, Snyder H, *et al*. Vascular contributions to cognitive impairment and dementia (VCID): A report from the 2018 National Heart, Lung, and Blood Institute and National Institute of neurological disorders and stroke workshop. Alzheimers Dement 2020;16:1714-33.

26. Vintimilla R, Balasubramanian K, Hall J, Johnson L, O'Bryant S. Cardiovascular risk factors, cognitive dysfunction, and mild cognitive impairment. Dement Geriatr Cogn Dis Extra 2020;10:154-62.
27. Li X, Lyu P, Ren Y, An J, Dong Y. Arterial stiffness and cognitive impairment. J Neurol Sci 2017;380:1-10.
28. Zhu Z, Liao H. Impact of cognitive impairment and systemic vascular comorbidities on risk of all-cause and cardiovascular mortality: National health and nutrition examination survey 1999 to 2002. Int J Cardiol 2020;300:255-61.
29. Yaneva-Sirakova T, Traykov L. Mortality rate of high cardiovascular risk patients with mild cognitive impairment. Sci Rep 2022;12:11961.
30. Arlt S, Lindner R, Rösler A, von Renteln-Kruse W. Adherence to medication in patients with dementia: Predictors and strategies for improvement. Drugs Aging 2008;25:1033-47.

How to cite this article: Dhikav V, Jadeja B, Gupta P. Cognition and cardiovascular comorbidities among older adults in primary care in West India. J Neurosci Rural Pract 2023;14:230-4.