Research Article
Open Access

Development and validation of a questionnaire for assessment of memory impairment and dementia, by a new modified memory function rating scale

Abstract

Background: Since, behavioural factors can also predispose dementia, there is an unmet need to develop methods for its early diagnosis, which appears to be crucial for its prevention. This study aims to find out the prevalence of dementia, emphasizing on early symptoms, to validate a new modified questionnaire.

Study Design and Setting. Cross-sectional survey in a hospital.

Subjects and methods: All subjects (n=2002) above 25 years of age (1016 males and 986 females) were randomly selected and recruited from urban population of Moradabad, North India. Validated questionnaires were used for the assessment of cognitive decline and dementia by a new modified memory function rating scale. Subjects were classified in to normal, mild, moderate and severe dementia by assessment of memory function.

Results: The overall prevalence of dementia (6.84%,n=137) was significantly more among men compared to women (8.26%) vs 5.37%, n=84 vs 53, P<0.02). However, the prevalence of dementia (22.37%,n=100) was much greater among subjects above 55 years of age in both sexes and trend was significant. The risk of memory dysfunction or dementia overall showed a graded increase with age from 25 to 84 years, and with decrease in social classes, in both sexes and the trends were significant (P<0.02). The frequency of tobacco intake, alcoholism and western type food intake, were significantly more common among patients with dementia compared to those without dementia. Therefore, the cause of lower prevalence of dementia in women, may be due to lower intake of alcohol and tobacco among Indian women.

Conclusions: This modified questionnaire can be successfully used for assessment of memory function in various social classes of north India, because this instrument allowed us to identify overall 6.84% (n=137) patients with dementia.

Keywords: western diet, sedentary behavior, mastication, cardiovascular diseases

Volume 11 Issue 2 - 2022

Ram B Singh,[1] Agnieszka Wilkzynska,[2] Viliam Mojto,[3] Jan Fedacko,[4] Ghizal Fatima,[5] MA Niaz,[6] Sonia Suchday[7]

[1]Halberg Hospital and Research Institute, Moradabad, India
[2]The Tsim Tsoum Institute, Krakow, Poland
[3]Department of Internal Medicine, Comenius University, Bratislava, Slovakia
[4]PJ Safaric University, Kosice, Slovakia
[5]Era Medical College, Era University, Lucknow, India
[6]International College of Nutrition, Halberg Hospital and Research Institute, Moradabad, India
[7]Psychology Department, Pace University, NY, USA

Correspondence: Dr.Viliam Mojto, MD, PhD Department of Internal Medicine, Comenius University, Bratislava, Slovakia, Tel 91 9997794102, Email viliam.mojto@gmail.com

Received: April 11, 2022 | **Published:**May 17, 2022

Introduction

Dementia has become the 5th leading cause of global deaths in 2016 compared to 14th in 2000.[1] Developed countries have systems in place for collecting data on causes of mortality and morbidity. However, most of the countries in Asia, do not have such systems, and the numbers of disability and deaths from specific causes have to be estimated from incomplete data. Therefore, improvements in producing high quality morbidity and mortality data are crucial for improving health and reducing preventable deaths and disability.[1] Since dementia is the fifth leading cause of death in the top ten global causes of deaths, there is a need to identify dementia at the earliest.[1] According to new guidelines issued by the World Health Organization, risk of dementia may be reduced by getting regular physical activity, cessation of tobacco consumption, preventing harmful use of alcohol and obesity, eating a healthy diet, and maintaining healthy blood pressure, cholesterol and blood sugar levels.[2] However, prevention of dementia may be possible, only, if it is diagnosed early before setting of neuronal damage.[3,4] Most experts agree that an early diagnosis of dementia may be difficult unless traditional lifestyle factors and behavioral factors as well as cultural factors are duly considered.[3] Majority of the questionnaires that are used for the diagnosis of dementia are based on Caucasians living in western countries.[5–8] Diet and lifestyle as well as cultural factors of these populations, completely differ from that of Asian populations.

In an earlier questionnaire developed in India, some of above issues were duly considered but most of the questions in this instrument were subjective.[4] The novelty of this study is that major attention has been paid to identify behavioral and cultural factors common in Asia, in particular India. Some of these differences have been included in modifying the existing questionnaires, giving desired emphasis on above questions, for early diagnosis of dementia and on guidelines for treatment.[4–10] Another novelty is that, a new modified questionnaire, has been constructed by incorporating both subjective and objective aspects of lifestyle and behaviors for an early and more accurate diagnosis of dementia. Since obesity and hypertension, that are risk factors of dementia, have become quite common in India,[11] the risk of dementia is also emerging.[12–14] There is scarcity of population based data, on behavioral factors, and risk of dementia, which justifies the planning of the present study. This study aims to develop and validate a new instrument, based on behavioral factors, as memory function rating scale for early diagnosis of dementia.

Subjects and methods

The study was conducted after clearance from the ethic committee and written informed consent from the patients. This epidemiological study included randomly selected 20 streets from the urban area of the city of Moradabad as reported earlier in the Five City study.[11] In each street, subjects were randomly selected, with an aim of choosing, 40-100 adults, aged 25 years and above from each block, based on voter,s

list. If the random number fell to a subject, who was <25yrs or not available, it was assigned to next person in the list. In this examination, we contacted 2422 urban subjects aged 25 years and above, of which 220 (9.08%) refused to participate and rest 2002 (1016 men and 986 women) gave their consent for inclusion in the study.

The investigators performed detailed interviews, with the help of pretested and validated questionnaires, for assessment of social class, prepared according to the guidelines of WHO and Indian Council of Medical Research. All the subjects were evaluated by a dietitian and physician administered questionnaire. In Indians, assessment of tobacco intake may be difficult, because it is consumed in multiple forms; cigarettes, beedies, Indian pipes, raw tobacco and chewing tobacco are all commonly consumed and people use tobacco in more than one form .It was therefore categorized users of any form of tobacco as smokers or tobacco users, as was done in previous study.[11] Subjects who admitted to ingesting alcohol more than once a week were categorized as alcohol consuming and those drinking more than 10 drinks per week as alcoholism. Food intakes were assessed with the help 3-day food intake records by using dietary diaries by each subject. The diaries were examined by the dietitian to find out exact food intake from the subject by using food measures, food portions and food models. Western type food intake was considered, if more than one third of the food intake(>400g) per day; were refined, bread, biscuits, cakes, syrups, refined and polished rice or sugar sweetened foods.

The classification of social classes was made by grading into 1-5 according to British Registrar General and other Indian studies based on attributes of education, occupation, housing conditions, ownership of consumer durables. The per capita income of the family was calculated by combining occupational and other incomes of the family divided by number of dependents as described earlier.11 Educational status was assessed from the number of years in education. Housing conditions and consumer durables were assessed as described in the earlier studies.11 Social class 1 was considered the highest and 5 the lowest socio-economic status. The diagnosis of dementia was based on earlier questionnaire based on WHO criteria. The questionnaire was administered in 22 apparently healthy subjects, for its validation, before starting the study.

Criteria for diagnosis of dementia

The criteria for the diagnosis of memory dysfunction or dementia were based and modified from previous criteria.[4] Mild memory dysfunction (MMD) was considered in presence of possible memory impairment (score 21-40) or memory impairment (score 41-60). Dementia was considered in presence of score 61-80 based on new modified questionnaire. Scores <:21, was considered occasional memory impairment (Appendix I).

Appendix I A modified Memory Function Rating Scale for Asian

Clinical manifestations studied for assessment of memory function and scores					
Attributes of memory dysfunction (Scores)	**Never, 0**	**Rarely, 1**	**Few times, 2**	**Often, 3**	**Very often, 4**
1.Difficulty in remembering names of neighbors, and grand children.					
2.Describe program just now you saw in television.					
3.Need a list for shopping to make sure that you do not forget any thing.					
4.Can you tell what food you ate today and yesterday?					
5.Forget where you have left your keys, purse and other personal objects.					
6.Do you forget what works to be done during the day?					
7.After going out, do you forget what for you came out?					
8.Is it difficult to recollect what you were talking a few seconds before?					
9.How often you forget day and date?					
10.Do you forget what people said soon to you?					
11.Do you often forget to use buttons and zippers?					
12.Do you repeat several times to yourself things that you have to do?					
13.Do you often forget names of your siblings, children, parents etc?					
14.Do you find difficulty in recollecting a word that is on tip of your tongue?					
15.Do you lose track of your ideas when you listen to some one else?					
16.Do you have difficulty in saying what you want to say?					
17.Do you need to check if you locked the door?					
18.Do you forget your address and other personal data?					
19.Do you have difficulty in doing simple calculations?					
20.Do you work slowly to calculate correctly?					

Score 21-40= Possible memory dysfunction; Score 41-60 = Mild Memory dysfunction; Score 61 to 80 = Dementia (Alzheimers), Scores <:21 occasional memory impairment.

Statistical analysis

This study includes only ordinal variables. The statistical significance of data was obtained by Chi square test be comparing the percentages in the two groups. Only P value <0.05, and two tailed t tests were considered significant.

Results

Among 2002 subjects examined, the age and sex distribution of the sample were comparable with the age and sex ratio in the population in the city Table 1 reveals the prevalence of dementia in both genders, according to age distribution. The prevalence of dementia was significantly more among men, compared to women (8.26% vs 5.37%, n=84 vs 53, P<0.02). However, the prevalence of dementia was much greater among subjects above 55 years of age in both sexes and trends were significant. The overall prevalence of dementia above 55 years was (22.37%, n=100) (Table 1). There were only 447 (22.3%) subjects above 55 years of age out of the total 2002 subjects Table 1.

The prevalence of grades of memory impairment are given in Table 2, showing that definite memory impairment was present in 4.54% of the subjects more in men than women. Only 3 (2.19%) subjects had Alzheimers diseases. Possible memory impairments were slightly less common than definite memory impairment Table 2.

Citation: Singh RB, Wilkzynska A, Mojto V, et al. Development and validation of a questionnaire for assessment of memory impairment and dementia, by a new modified memory function rating scale. *MOJ Public Health.* 2022;11(2):64–69. DOI: 10.15406/mojph.2022.11.00377

Table 1 Prevalence of dementia (including memory dysfunction) by age and sex among urban population in North India

Age group	No	Men (n=1016)	Women (n=986)		Total (n=2002)	
		Dementia No (%)	No	De mentia No (%)	No	Dementia No (%)
25-34	304	-	354	-	658	-
35-44	290	9(3.1)	254	7(2.7)	544	16(2.9)
45-54	182	11(6.0)	171	10(5.8)	353	21(5.9)
55-64	128	19(14.8)*	123	11(8.9)*	251	30(11.9)*
65-74	65	22(33.8)*	54	12(22.2)*	119	34(28.6)*
75-84	47	23(48.9)*	30	13(43.3)*	77	36(46.7)*
X2 for trend		102.4		62.2		112.3
P Value		0.002		0.002		0.001
Total	1016	84(8.26)*	986	53(5.37)	2002	137(6.84)

Values are n(%), P value was obtained by Chi square test; *= P<0.02

Table 2 Grades of memory impairment among men and women

Grades	Men (n=1016) n (%)	Women (n=986) n (%)	Total (n=2002) n (%)
Occasional memory impairment. Scores<21	125(12.3)	112(11.3)	237(11.8)
Possible memory impairment	31(3.05)	12 (1.27)	43(2.15)
Scores 21-40			
Memory impairment Scores 41-60	51 (5.02)*	40 (4.05)*	91(4.54)*
Dementia (Alzheimers)	2 (0.19)	1(0.10)	3 (2.19%)
Scores 61-80			
Total	84 (8.26 %)	53 (5.27%)	137 (6.84%)

*= P< 0.02, P value was obtained by Chi square test. Occasional memory impairment was considered normal.

The prevalence of dementia according to socio-economic status is given in Table 3. In both genders, the prevalence of dementia showed a graded increase, with decline in socio-economic status from social class 1 to social class 5, and the trends were significant. The overall prevalence of dementia was significantly greater among subjects in social classes 4 and 5, than in higher social classes 1-3, respectively (9.89% vs 6.36%,n=556 vs 1446, P<0.001) Table 3.

Prevalence of dementia in relation to risk factors are shown in Table 4. The findings reveal that proportions of tobacco intake and alcoholism were significantly more common among men compared to women among subjects with dementia than subjects without dementia. No alcoholism was found among women and tobacco intake was also rare in women. The overall prevalence of tobacco intake was 19.63%, (n=393) Table 4.

Discussion

This study shows, that this modified questionnaire can be successfully used for assessment of memory function rates in a semiliterate population of social class 4 and 5 as well as literate and educated population of social classes 1-3, of north India. The questionnaire allowed us to identify overall 8.84% (n=137) subjects with dementia, including 8.26 % among men (n=84) and 5.27% (n=53) among women (Table 1, 2). The findings revealed that using the modified questionnaire, targets subjective questions as well as objective questions, which may be answered by subjects with the help of the interviewer (Appendix I). The first ten questions are more of subjective nature in which subjects have to recollect and answer. The rest ten questions aim to find out objective activity such as forgetting closures of buttons and zippers and telling names of siblings. The questionnaire appears to be as accurate as other existing questionnaires.[5–10] It should also identify and differentiate mild cognitive impairment with no significant impairment of daily living, from dementia that has moderate to severe impairment in daily living activities.[9] This is important for application of clinical practice guidelines proposed by various agencies, for management of dementia.[5–9] We observed that the prevalence of memory impairment and possible memory impairment were not significantly different (Table 2). It is possible that possible memory impairment can be treated by diet and lifestyle changes, indicating that half of the burden of dementia can be reduced without drug therapy.

Table 3 Prevalence of dementia according to social classes among men and women

Social class	No	Men with dementia (n=84)	No	Women with dementia (n=53)	No	Total (n=137)
Social class 1	325	21(6.46)	316	11(3.48)	641	42(6.55)
Social class 2	216	15(6.94)	203	8(3.94)	419	23(5.48)
Social class 3	198	19(9.59)	188	8(3.74)	386	27(6.99)
Social class 4	179	19(10.61)	184	16(6.95)	363	35(9.64)
Social class 5	98	10(10.20)	95	10(10.52)	193	20(10.36)
Chi square trend		98.7*		88.9*		112.5*
Total	1016	84(8.26%)	986	53(5.27)	2002	137(6.84)

Values are n(%),*=p <0.01, P values were obtained by Chi square test by comparing percentages of dementia according to social classes.

Table 4 Prevalence of risk factors among men and women with and without dementia

Risk Factors	Dementia (n=137)		No dementia (b=1865)	
	Men (n=84)	Women (n=53)	Men (n=932)	Women (n=933)
Tobacco intake (>once/week)	67(79.76)**	15(28.3)*	293(31.44)	18(1.92)
Alcoholism (>10 drinks/ week)	8(9.52)**	-	23(2.47)	-
Western type food intake {>400 g/day)	61(72.62)**	21(39.62)*	285(30.57)	47(50.37)
Age >55 years	64(76.2)**	37(69.8)**	240(25.7)	207(22.2)

Values are n (%), *=p<0.05,**=p< 0.01, P values were obtained by Chi square test by comparing percentages of risk factors among subjects with dementia and no dementia.

The purpose of an assessment scale is to increase the precision of a decision by reducing subjective information given by patients and increasing more of objective questions which allow us to produce by other investigators.[8] Such instruments may be used in a cognitive screening test to screen for underlying dementia and to identify impairment due to dementia compared to normal age-related cognitive alterations as well as for monitoring of the effects of treatment of dementia in a clinic or clinical trial.[8–10] This questionnaire may not be suitable for clinical practice because its longer and takes more time as well as needs help of the interviewer. However, this instrument appears to be an ideal and accurate assessment scale because its valid

and it has strong face validity, because questions asked are relevant and important. Moreover, it also measures the construct for which it was designed, to measure and it may also have concurrent validity, if used alongside a very well validated scale. The questionnaire needs to be examined by multiple investigators to find out its inter-rater reliability by demonstrating its use in same subjects showing same results. In addition, few studies have found that socioeconomic factors may also be associated with dementia, which may confound and influence diet and lifestyle factors, as well as risk of dementia.[15–19]

Limitations in the light of other questionnaires

Our questionnaire may appear confusing to some interviewers. However, other questionnaires may have same problems; for example, Comprehensive Assessment Geriatric, in force in Europe, for the diagnosis of fitness cognitive uses two tests: MMSE (Mini Mental) and CDR (Test Clock drawing.[20] Non-psychologists also most often use AMTS (bo has 10 points and high sensitivity and specificity), and in Poland and the USA as well Mini-COG. Interestingly, there is still a discussion about reliability of these tests, because they are tailored mainly to identify the type of dementia such as Alzheimer's, disease.[20,21] In a comparative study, cognitive performance was assessed at both re-examinations using a three-step dementia diagnosis protocol: screening phase, clinical phase, and differential diagnostic phase.[8] In the first assessment, subjects who scored 24 on the Mini-Mental State Examination (MMSE) at screening, were referred for further examinations in the clinical phase.[20] Subjects in the second examination were referred to the clinical phase if they scored 24 points on MMSE, or had a decline of 3 points on MMSE, or if they scored <70% in delayed recall on the Consortium to Establish a Registry for Alzheimer's Disease (CERAD) word list.[21] These criteria may be applied to increase sensitivity for the detection of milder cognitive impairment. The clinical phase should involve detailed neurological, neuropsychological, and cardiovascular examinations, and the differential diagnostic phase involve brain imaging (Magnetic Resonance Imaging (MRI)/Computerized Tomography (CT)), blood tests, and, if needed, cerebrospinal fluid analysis and electrocardiogram.[21,22]

The review board for confirmation of diagnosis should include physician, senior neurologist, and neuropsychologist, who should have all assessment information to specify the primary diagnosis. The criteria for the diagnosis of dementia may be based on the Diagnostic and Statistical Manual of Mental Disorders (DSM).[22] The diagnosis of Alzheimer's disease may be based on the National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA).[23] It seems, the Clock Drawing test would continue for screening.[24] The assessment of cognition can be made as part of detailed examination of higher functions by examining mental state with various available instruments which is important for planning intervention to individuals.[9] In lower social classes, Everyday Activities Scale for India (EASI) developed during the Indo-US Cross-National Dementia Epidemiology Study, may be useful among Indians as well as in other developing and newly industrialized populations.[9] This questionnaire can also help in assessing the severity of dementia in routine clinical practice and may be more accurate than Clinical Dementia rating scale, but it is more time consuming. The Six Item Cognitive Impairment Test (6CIT) is a brief cognitive function test which may be the best because it takes hardly six minutes. It involves three orientation items – counting backwards from 20, stating the months of the year in reverse and learning an address

The prevalence of dementia is lower in our sample compared to other studies because our sample included young population, 25 years and above. There were only 447 (22.3%) subjects above 55 years of age out of 2002 subjects, indicating lower ageing of population compared to South India and other developed countries.[12–14] The risk of dementia shows significant increase with increase in age after 55 years (Table 1). In a cross-sectional survey from India among 560 participants, 140 (25%) had cognitive impairment and the risk was higher among rural (27.6% vs 18.5%) and female (29.8% vs 19.1%) subjects compared to urban and male sex, respectively.[12] In a cohort study, involving 1066 eligible participants who had normal cognition at baseline, 104 developed dementia (98 with AD) over a follow-up period of 8.1 years.[13] The incidence rates per 1000 person-years for AD was 11.67 (95% CI: 10.9–12.4) for those aged ≥55 years and higher for those aged ≥65 years (15.54, 95% CI: 14.6–16.5). In those aged ≥65 years, the world age standardized incidence rate was 21.61 per 100,000. It seems to be an important study, reporting AD incidence rates from southern India. These rates of AD, appear to be much greater than that reported from rural north India, comparable with those reported from China, and marginally lower than those reported from the western world.[13] In our study, our study, which is from north India, the prevalence of AD (0.15%,n=3) was quite low. In an earlier study, the prevalence of dementia among 595 elderly subjects > 50 years, was 18.6%(n=111) in the urban population.[4] The differences in prevalence may also be explained due to chrono-physiological and psychological risk factors that may vary among populations.[14]

We also observed higher prevalence of dementia among lower social classes 3 to 5, compared to higher social classes and the trends were significant (Table 3). The higher social class subjects are more educated, rich and affluent, compared to lower social classes, who are mostly least educated and relatively poor. In a previous study among 2457 older people (mean age 73.6 years; 1019 (41.5%) nonwhite), who were free of dementia at baseline, role of social class was examined in the Health, Aging, and Body Composition study.[15] Over a follow up of 12 years, 449 (18.3%) subjects developed dementia. Non-white subjects were more likely than white people, to develop dementia (211 (20.7%) *v* 238 (16.6%), P<0.001. It is possible that differences in the burden of risk factors, in particular social class, may contribute to the higher rates of dementia seen among nonwhites compared with white older people. In another study, comprising of 6220 subjects, aged 65 years and older, 3410 (54.8%) female), 463 individuals (7.4%) were new cases of dementia ascertained in the 12 years.[16] The risk of dementia was greater in those with the lowest wealth quintile compared with those in the highest quintile, independent of education, index of multiple deprivation, and health indicators.[16]

The frequency of alcoholism and tobacco intakes were significantly more among subjects with dementia compared to rest of the subjects without dementia (Table 4). In a meta-analysis among 11,143 subjects, follow up after 3.8 years revealed, there was no difference in risk for any dementia between 'ever smokers' compared to 'never smokers' (HR 0.96; 95% CI 0.82–1.13); 'current smokers' compared to 'never smokers' (HR 0.83; 95% CI 0.66–1.06); 'former smokers' compared to 'never smokers' (HR 1.06; 95% CI 0.88–1.27); 'current smokers' compared to 'former smokers' (HR 0.86; 95% CI 0.66–1.13).[17] Tobacco consumption (packyears) for lifetime, was not associated with any dementia and the results were not different for AD. Pooled results from all the countries showed no significant association between smoking and the onset of any dementia which may be due to selective cessation of tobacco in later-life that might have biased the results towards no effect.[17] In another cohort study among 3021 subjects, aged 72 years and older, follow up for 6 years showed that alcohol intake within recommended limits was not significantly associated with a lower risk of dementia among participants with or without mild cognitive impairment at baseline.[18] Among participants

without mild cognitive impairment, daily low-quantity drinking was associated with lower dementia risk compared with infrequent higher-quantity drinking. In a further cohort study, involving 9087 subjects, aged 35-55 years, 397 cases of dementia were recorded over a mean follow-up of 23 years.[19] Abstinence in midlife was associated with a higher risk of dementia (hazard ratio 1.47, 95% confidence interval 1.15 to 1.89) compared with consumption of 1-14 units/week. Among those drinking >14 units/week, a 7 unit increase in alcohol consumption was associated with a 17% (95% confidence interval 4% to 32%) increase in risk of dementia. CAGE score >2 (hazard ratio 2.19, 1.29 to 3.71) and alcohol related hospital admission (4.28, 2.72 to 6.73) were also associated with an increased risk of dementia. It is possible that the risk of dementia was increased in people who abstained from alcohol in midlife or consumed >14 units/week. The consumption of western type foods was significantly more common among subjects with memory dysfunction compared to healthy subjects (Table 4). Other studies have also reported the adverse effects of diet on memory dysfunction and dementia.[3]

There is evidence that there are state-based epidemiological data on dementia in India, which indicate that dementia has become a major public health problem.[25] There may be, variabilities and inconsistencies in the findings of the reported studies. A meta-analysis was conducted including 20 epidemiological studies consisting of 86,312 subjects, out of which a total number of 1193 subjects were found to have dementia.[25] Interestingly, the number of elderly that suffered from dementia were only 20 per 1000 population (95% confidence interval: 0.02–0.03), which is approximately 2% prevalence, which is much lower than our study. The differences could be due to inclusion of possible memory impairment in our study. Another difference in the results is that the prevalence rates were similar for males and females, whereas in our study, rate was greater in men compared to women who rarely drink and use tobacco.

No other study, to our knowledge, has cared to develop questionnaire in India and also possibly in Asia and other newly industrialized countries, considering culture specific lifestyle and behavior common in these countries.[26] It is important that the instrument screening dementia should be accurate and applicable to populations of various ethnicity.[5-9] In most cultures, dementia may be characterized with its influence on judgement, speech and memory, making patient judgements less reliable. It is most important to consult care takers, such as family or professional care takers, in particular, judgements related to functional impairment, quality of life and behavior problems. It seems that cognition, function, behavior, quality of life and presence of depression are important characteristics of dementia.[8] Therefore, these manifestations should be duly considered during measurement of memory function by using new instrument. In 2016, more than half (54%) of total 56.9 million deaths worldwide, were due to the top 10 causes (Figure 1).[1]

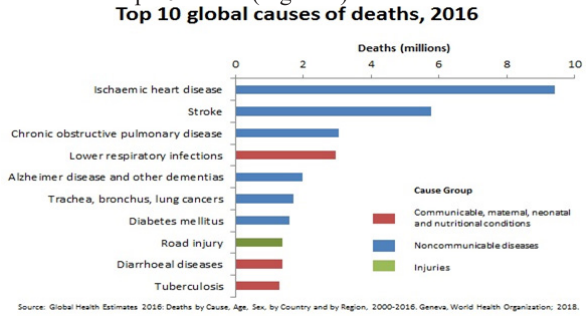

Figure 1 Causes of deaths, showing dementia as fifth important cause of deaths (WHO 2018).

Coronary artery disease (CAD) and stroke are the world's biggest killers, accounting for a combined 15.2 million deaths in 2016 which continue to be the leading causes of death globally in the last 15 years. They are also potential risk factors of dementia. The death claims via chronic obstructive pulmonary disease were 3.0 million lives in 2016, while lung cancer caused 1.7 million deaths. Deaths due to diabetes in 2016 were 1.6 million, which were less than 1 million in 2000. However, it is surprising, that deaths due to dementias were more than doubled between 2000 and 2016. The deaths due to dementia may be prevented by early diagnosis in the stage of possible memory impairment, and early intervention with diet and lifestyle alterations.[27-30]

Significant statement

This study discovered the availability of a new instrument that can be beneficial for early identification of dementia. It is possible that this study will help the researchers to uncover the critical areas concerned with role of behavioral risk factors in the pathogenesis of memory impairment, that many researchers were not able to explore. Thus, a new theory on developing an instrument for restoration of memory function may be arrived from this study.

Conclusion

The prevalence of dementia is lower in India compared to high and middle income countries, which may be due to lower ageing of populations due to lower life expectancy. This modified questionnaire can be successfully used for the identification of memory impairment rates in a semiliterate population of social class 4 and 5 as well as among educated population of social classes 1-3. The questionnaire identified overall 8.84% subjects with dementia, including early memory impairment. Interestingly half of the patients, had only possible memory impairment. The lower prevalence of dementia among women may be due to lower intake of tobacco and lower alcoholism. The findings revealed that using the modified questionnaire, including subjective as well as objective questions, the physician or scientist administering the instrument, can identify the subjects suffering from various grades of dementia, which could be prevented by cessation of tobacco and alcohol consumption and regular intake of Indo-Mediterranean foods.

Compliance with publication ethics

All subjects gave informed consent for participation in the study. The study was approved by the ethic committee of the Halberg Hospital and Research Institute. Moradabad, India

Conflicts of interest

Here has not been report on conflict of interest by any of the authors.

Authors contributions

All the data were collected by RBS and MAN. The questionnaire was developed and article was drafted by RBS with the help from AW, and VM. All other coauthors AW,JF,MAN,SJ, SS read the article, helped in writing the manuscript and gave their comments for final approval.

Funding

Initial funding was provided by Sandoz Foundation of Gerontologic Research, Switzerland and International College of Nutrition.

References

1. *Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016*. Geneva, World Health Organization; 2018.
2. *World Health Organization, Adopting a healthy lifestyle helps reduce the risk of dementia*. 2019.
3. Singh RB, Watanabe S, Li Duo, et al. Diet and lifestyle guidelines and desirable levels of risk factors and protective factors for prevention of dementia: a scientific statement from joint symposium of JAAS and APCNS. *Biomed Sci and Tech Res*. BJSTR. MS.ID.003006. 2019;17(3)
4. Singh RB, Rao RS, Thakur AS, et al. Prevalence and risk factors of cognitive deficits and dementia in relation to socioeconomic class in an elderly population of India. *J Anti Ageing Med*. 1999;2(2):141–148.
5. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders. 4th edn. Washington, DC: American Psychiatric Press*; 1994. p. 320–327.
6. Jorm AF, Mackinnon AJ, Henderson AS, et al. Psycho-gediatric assessment scales. *Psychol Med*. 1995;25(3):447–460.
7. Jorm AF, Mackinnon AJ, Christensen H, et al. The psychogeriatric assessment scales (PAS): further data on psychometric properties and validity from a longitudinal study of the elderly. *Int J Geriatr Psychiatry*. 1997;12(1):93–100.
8. Sheehan B. Assessment scales in dementia. *Ther Adv Neurol Disord.* 2012;5(6):349–358.
9. Shaji KS, Sivakumar PT, Rao GP, et al. Clinical Practice Guidelines for management of dementia. *Indian J Psychiatry.* 2018;60(Suppl 3):S312–S328.
10. Burns A, Lawlor B, Craig S. Rating scales in old age psychiatry. *Br J Psychiatry*. 2002;180:161–167.
11. Singh RB, Fedacko J, Pella D, et al. Prevalence and risk factors for prehypertension and hypertension in five indian cities. *Acta Cardiol*. 2011;66(1):29–36.
12. Patel RM, Singh US. Prevalence study of cognitive impairment and its associated sociodemographic variables using mini-mental status examination among elderly population residing in field practice areas of a medical college. *Indian J Community Med*. 2018;43(2):113–116.
13. Mathuranath PS, George A, Ranjith N, et al. Incidence of Alzheimer's disease in India: a 10 years follow-up study. *Neurol India*. 2012;60(6):625–630.
14. Singh RB, Wilczynska A, Shastun S, et al. Association of chrono- physiological and psychological risk factors among patients with acute coronary syndromes. *World Heart J*. 2017;9(2):123–134.
15. Yaffe K, Falvey C, Harris TB, et al. for the Health ABC study. Effect of socioeconomic disparities on incidence of dementia among biracial older adults: prospective study. *BMJ*. 2013;347:f7051.
16. Cadar D, Lassale C, Davies H. Individual and area-based socioeconomic factors associated with dementia incidence in England: evidence from a 12-year follow-up in the English Longitudinal Study of Ageing. *JAMA Psychiatry*. 2018;75(7):723–732.
17. Leonardo J Otuyama, Déborah Oliveira, Danilo Locatelli, et al. Tobacco smoking and risk for dementia: evidence from the 10/66 population-based longitudinal study. *Aging & Mental Health*. 2020;24(11):1796–1806.
18. Koch M, Fitzpatrick AL, Rapp SR, et al. Alcohol Consumption and Risk of Dementia and Cognitive Decline Among Older Adults With or Without Mild Cognitive Impairment. *JAMA Netw Open*. 2019;2(9):e1910319.
19. Sabia S, Fayosse A, Dumurgier J, et al. Alcohol consumption and risk of dementia: 23 year follow-up of Whitehall II cohort study. *BMJ*. 2018;362:k2927.
20. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res*. 1975;12(3)189–198.
21. Morris JC, Heyman A, Mohs RC, et al. The consortium to establish a registry for Alzheimer's disease (CERAD). Part I. Clinical and neuropsychological assessment of Alzheimer's disease. *Neurology*. 1989;39(9):1159–1165.
22. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*: DSM-IV, 4th ed.;American Psychiatric Association: Washington, DC, USA, 1994.
23. McKhann G, Drachman D, Folstein M, et al. Clinical diagnosis of Alzheimer's disease: Report of the NINCDS-ADRDA work group under the auspices of department of health and human services task force on Alzheimer's disease. *Neurology*. 1984;34(7):939–944.
24. Borson S, Brush M, Gil E, et al. The Clock Drawing Test: Utility for Dementia Detection in Multiethnic Elders. *Journal of Gerontology:":-MEDICAL SCIENCES*. 1999;54(11):M534–M540.
25. Chaudhuri A, Ranjjan JK, Asthana HS. Prevalence of dementia in India: A Systematic Review and MetaAnalysis. *Indian J Pub Health*. 2021;65(2):152–158.
26. Catindig JA, Venketasubramanian N, Ikram MK, et al. Epidemiology of dementia in Asia: insights on prevalence trends and novel risk factors. *J Neurol Sci.* 2012;321(1–2):11–16.
27. Prina M. *Alzheimer's Disease International (ADI), Alzheimers Australia, Published by Alzheimer's Disease International, London, UK*. 2014.
28. GBD 2016 Dementia Collaborators. Global, regional, and national burden of Alzheimer's disease and other dementias, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet Neurol*. 2019;18(1):88–106.
29. Livingstone G, Sommerlad A, Orgeta V, et al. The Lancet Commissions. Dementia prevention, intervention, and care. *The Lancet*. 2017;390(10113):2673–2734.
30. Singh RB, Wilczynska, Fedacko J, et al. Association of Indo-Mediterranean neuroprotective dietary(MIND) pattern with memory impairment and dementia, in an urban population of north India. *Inter Jour of Clinical Nutrition*. 2021;21:11–20.

Citation: Singh RB, Wilkzynska A, Mojto V, et al. Development and validation of a questionnaire for assessment of memory impairment and dementia, by a new modified memory function rating scale. *MOJ Public Health.* 2022;11(2):64–69. DOI: 10.15406/mojph.2022.11.00377