MEMORY COMPLAINTS AND TEST PERFORMANCE IN HEALTHY ELDERLY PERSONS

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ABSTRACT - In order to compare the use of a structured self-report questionnaire with direct questioning about memory problems, 71 healthy and independent aged individuals (63 women) from the community without risk factors for cognitive deficits were objectively asked about subjective memory complaints (SMC), given the Memory Complaint Questionnaire (MAC-Q) and then submitted to the Rey Auditory Verbal Learning Test (RAVLT). SMC positively correlated with higher scores on MAC-Q, although a significant percentage of the sample had SMC and lower scores on MAC-Q and also no SMC and higher scores on MAC-Q. Performance on RAVLT was significantly worse (p<0.05) for the group presenting SMC but not for the group with higher scores on the MAC-Q. We conclude that direct questioning maybe more clinically significant than a self report questionnaire, at least for elderly persons from the community without risk factors for cognitive decline or depression.

KEY WORDS: memory, cognition, ageing, neuropsychological tests.

Queixas de memória de idosos saudáveis e desempenho em testes

RESUMO - Objetivando comparar o uso de questionário estruturado autopreenchido com o questionamento direto acerca de problemas de memória, 71 indivíduos idosos saudáveis (63 mulheres) da comunidade sem fatores de risco para déficits cognitivos foram perguntados acerca de queixas subjetivas de memória (SMC), submetidos ao Questionário de Queixas de Memória (MAC-Q) e ao Teste de Aprendizado Auditivo-Verbal de Rey (RAVLT). Embora a presença de SMC tenha se correlacionado com escores mais altos no MAC-Q, uma percentagem significativa da amostra obteve escores baixos apesar da presença de SMC, além da existência de indivíduos sem SMC com escores altos no MAC-Q. O desempenho no RAVLT foi significativamente pior no grupo com SMC (p<0,05) mas não no grupo com escores altos no MAC-Q. Concluimos que o questionamento direto pode ser mais significativo clinicamente que um questionário autopreenchido, ao menos para indivíduos idosos na comunidade sem fatores de risco para déficit cognitivo ou depressão.

PALAVRAS-CHAVE: memória, cognição, envelhecimento, testes neuropsicológicos.

The degree of intellectual decline in old age is strongly associated with genetic and environmental factors[1]. A failure to cope with tasks requiring mental flexibility and speed in the processing of information can be observed during this life phase. There is also a decrease in the acquisition and in the spontaneous recovery of verbal and non-verbal materials, as well as a faster forgetfulness of them[2]. Reports of dysmnesia become common and require the physician to differentiate between normal changes associated with aging and those related to morbid processes. Complaints about memory impairment, commonly known as *subjective memory complaint* (SMC) are fairly common in elderly people, but its clinical significance is still a matter of controversy. Some studies suggest that the individuals making such complaints display a lower performance in memory tests[3-7], but there are conflicting findings in other studies[8]. Intact metamemory has already been demonstrated in some early cases of dementia, when individuals refer more SMC than normal elderly people[9-11]. The concept of metamemory refers to the individual's capacity to evaluate his own memory, an ability that may remain steady in normal aging. Depressive mood, however, can be associated to SMC without any deficits in memory tests[11], suggesting

impairment in this self perception. The possibility of a correct perception of subtle memory deficits without impairment of performance in memory tests[12] should not be overlooked, especially in patients who are not depressed. In this case, metamemory would be considered normal, and the problem would lie on low test sensitivity.

Studies on metamemory in the elderly are of the outmost importance for some reasons. First, persons unable to make a correct judgment about their own memory may remain engaged in potentially risky activities or restrain their own autonomy too much[12]. Those unaware of the deficits will not seek medical help early, too. Second, more data is needed to help clinicians correctly interpret memory complaints (or its absence) in everyday practice. Among the many existing criteria for dysmnesia in the elderly, one of the most popular is the Age-Associated Memory Impairment - AAMI[13]. The AAMI criteria includes age over 50, presence of memory complaints for everyday tasks as well as a decline in performance in memory tests, either for verbal and non-verbal material. The Memory Complaint Questionnaire (MAC-Q) was designed to address memory complaints for the AAMI criteria[14], the cut-off point established by the authors being 25. MAC-Q is a self-report questionnaire of 5 questions addressing daily activities and one question addressing overall memory functioning comparing present moment to when the person was 18 to 20 years old. Respondents must choose one of the 5 options ranging from *much better now* to *much worse now*[14]. However, in clinical practice physicians commonly ask their individuals about their memory but do not regularly use questionnaires. If the physician decides to use simple and very brief memory tests during consultation (like the items in Mini-Mental State Examination), only those individuals with a significant decline will be impaired, since their sensivity is considered too low for subtle memory deficits. Referral for a complete neuropsychological evaluation, which is time-consuming and expensive, is not warranted for every individual presenting SMC. However, it is not clear for most physicians when to refer an elder patient with SMC to neuropsychological evaluation. Due to the high frequency of memory complaints in old age and to the importance of a differential diagnosis between normal and abnormal cognitive decline, the purpose of this study is to check the relation between SMC and dysmnesia objectively assessed by the MAC-Q.

The objective of this study was to compare the answer to the one question "*have you been having memory difficulties that upset your everyday life*" posed by the interviewer, the scores on the MAC-Q (given at the end of the interview) and the performance on memory tests in order to evaluate which approach (direct questioning versus self-report questionnaire) correlates better with memory functioning.

METHOD

75 community healthy and independent persons aged 60 or older, regularly attending a program for the elderly at the Federal University of Rio de Janeiro responded to an invitation to participate on "a study on memory in the elderly". This program consisted of educational and recreational activities for the elderly from the community living in the nearby area. The staff in the program simply invited the participants when they arrived for the program activities and neither got into further details nor asked questions about memory functioning. They were then referred to our facility where they interviewed by either a geriatrician or a psychiatrist and then submitted to neuropsychological evaluation by a psychologist blind to the presence of memory complaints. All participants signed an informed consent. The sample consisted mainly (89%) of women, a well-known characteristic of programs for the elderly in Brazil.

Inclusion criteria: 4 or more years of education; absence of depression [a score less than 5 on the 15-item Geriatric Depression Scale of Yesavage[15] or 7 in the 21-item Hamilton Scale for Depression] and independence [acts without assistance or supervision in the following instrumental activities of daily living: management of own finances, the ability to go out of the house alone and do own shopping[16]]. *Exclusion criteria*: history of head trauma, any neurological or psychiatric illness; use of benzodiazepines in the last 3 months; use of illicit drugs; visual, auditory and/or motor impairment, Mini Mental State Exam[17] below 18 for participants with a 4 to 7 years of education, and below 26 for those with 8 or more years of education, according to brazilian normative data[18]; any symptomatic cardiovascular condition. No physical exam was performed.

Interview: Participants were interviewed prior to the neuropsychological evaluation and inclusion or exclusion criteria were investigated. Auditory or visual deficit were informally evaluated and a single question was posed about problems in the everyday life due to mnemic deficits ("*Have you been having memory difficulties that upset your everyday life?*"). The volunteer was then classified as "with complaint" (C) or "with no complaint" (NC). The MAC-Q was given at the end of the interview.

Memory Assessment: The examination was carried out shortly after the interview. Rey Auditory Verbal Learning Test - RAVLT[19] was given on an individual basis. This test consists of 2 lists of 15 words each (lists A and B), arranged in a fixed order. List A is read aloud by the examiner (A1) and immediately thereafter the patient must recollect as many words as he can. The examiner then repeats the same procedure for 4 more times (A2 to A5). A normal

performance is characterized by an increasing recall of words throughout the essays, usually referred as *learning curve*. List B is read aloud only once, after the 5th recollection of List A (A5) and the patient receives the same previous instructions. List B is actually a distracter to prevent rehearsal of the material being held in short-term memory. The examiner then asks the patient to recall List A again without reading it (immediate free recall, A6). After 15 minutes, another free recall is asked (delayed free recall, A7). Recognition, the last stage of the test, consists of a list of 30 words read aloud by the examiner when the patient must indicate which words were on List A.

Statistical analysis: The difference between SMC and MAC-Q taking into account age and education was analyzed by the non-parametric Mann-Whitney´s U test. The same test was used for analyzing the relationship among SMC, MAC-Q and performance on the RAVLT. The Quisquare test was used to check the relationship among SMC, MAC-Q and gender, and to check the association between SMC and MAC-Q (Table 1). The significance level was 5%, and the program employed was SPSS for Windows v.10.

RESULTS

Of the 75 elderly people channeled for the study, 4 did not complete the evaluation, so that the data became available for 71 participants, of which 8 were men (11%) and 63 were women (89%). The volunteers' mean age was 70, with a minimal age of 63 and a maximum age of 82. The average number of years of education was 10.5. There were 33 (46.5%) NC participants and 38 (53.5%) C in the group, whereas 33 (46.5%) displayed a MAC-Q under 25 and 38 (53.5%) summed up 25 or more marks in the MAC-Q. No association was found between SMC and sex (p=0.832), age (p=0.607) or education (p=0.477). Review of the MAC-Q results indicated they were similar for sex (p=0.589), age (p=0.831), and education (p= 0.428). Three questions helped to address the relationship between SMC, MAC-Q and the performance on RAVLT.

1) Is there a relationship between SMC and MAC-Q? Table 1 reveals a strong relationship between the presence of SMC and the score in the MAC-Q. The majority but not the totality of C individuals [29 (76.3%)] obtained 25 points or more in the MAC-Q (p<0.05).

2) Is MAC-Q predictive of a low cognitive performance? Table 2 shows there was no significant difference on the RAVLT between individuals with higher (=25) and lower scores on MAC-Q

3) Is SMC predictive of a low cognitive performance? The performance on the RAVLT (Table 3) was similar between the C and NC groups in the number

Table 1. Relation between SMC and MAC-Q.

	N (%) MAC-Q <25	N (%) MAC-Q ≥25
C	9 (27.3%)	29 (76. 3%)
NC	24 (72.7%)	9 (23.7%)
Total	33 (100%)	38 (100%)

Chi-square p<0.05. NC- no memory complaints; C- memory complaints.

Table 2. Average number of words recovered in the the MAC-Q and RAVLT.

	A1	A5	A1-A5	B	A6	A7	Rec
MAC-Q <25 (n= 33)	5.45	10.87	5.42	4.51	7.93	8.03	27.15
MAC-Q ≥25 (n=38)	5.36	10.42	5.05	4.86	7.44	7.18	27.42
p (<0.05)	0.986	0.434	0.381	0.778	0.520	0.242	0.481

A1, average words recovered after the first try; A5, average words recovered after the fifth try; A1-A5, mean difference of recoveries between the fifth and the first try; B, average words recovered from List B; A6, average words recovered from List A after recollection of List B; A7, recovery of List A after 15 minutes; Rec recognition.

Table 3. Average number of words recovered in the SMC and RAVLT.

	A1	A5	A1-A5	B	A6	A7	Rec
NC (n=33)	5.42	11.18	5.75	4.60	8.57	8.30	27.72
C (n=38)	5.39	10.15	4.76	4.78	6.89	6.92	26.92
Significance (p<0.05)	0.907	0.112	0.074	0.939	0.029	0.048	0.038

A1, average words recovered after the first assay; A5, average words recovered after the fifth assay; A1-A5, mean difference of recoveries between the fifth and the first assay; B, average words recovered from List B; A6 - average words recovered from List A after recollection of List B; RAI, retroactive interference: the difference between A6 and A5 (A6-A5); PAI, proactive interference: the difference between B and A1 (B-A1); A7, recovery of List A after 15 minutes; Rec- recognition.

of words recollected after the first presentation of List A (A1), whose average results were, respectively, 5.42 and 5.39, (p=0.907). The same occurred with List B, in which groups C and NC obtained an average span of 4.60 and 4.78 words (p=0.939). A tendency to statistical significance was found (p=0.074) in the amount of words learnt from A1 to A5 (normally calculated by A5 minus A1): C and NC volunteers learnt 4.76 and 5.75 words, respectively. A significant difference (p=0.029) was found in the recovery of List A immediately after recollection of List B (A6): C individuals obtained an average 6.89 and NC individuals acquired 8.57 words. In A7 (recovery of List A after 15 minutes from A6), a significant difference was also observed between the C and NC individuals (p= 0.048). This discrepancy between groups was also seen in the recognition of List A (p= 0.038).

DISCUSSION

Memory complaints are common in elderly people and require the physician to evaluate them properly in order to decide if a further and thoroughly evaluation is warranted. Reports that SMCs are more common in women[1,7] may suggest a possible connection to estrogenic deprivation in climacteric phase[20]. The relationship between gender and the SMC could not be established on this study because of the small number of men in the sample. Education was not associated to the presence of SMC or test performance. The strong relationship between SMC and MAC-Q (scores = 25) was expected, since the questionnaire was developed to detect memory impairment in elder people without cognitive decline (individuals presenting MMSE below normal were excluded from our sample). As individuals with conditions that entail an impairment of metamemory, such as depression[6] and dependency to perform the activities of everyday life[12], had been excluded from our sample, the presence of SMC was positively associated with higher scores on MAC-Q. It is noteworthy however that some individuals with SMC had normal scores on MAC-Q, a finding that has important clinical implications. The presumption that questionnaires (like MAC-Q) maybe more reliable than direct questioning would lead to the conclusion that individuals with SMC and lower scores on MAC-Q do not present symptomatology that requires further investigation. However, our study shows *exactly the opposite*: SMC - and not scores on MAC-Q - was associated with a worse performance on RAVLT. The presence of SMC predicted a worse performance on RAVLT in aspects considered very sensitive to memory decline: delayed free recall

and recognition. Since the individuals with worse performance on RAVLT did not have dementia and were otherwise healthy and independent, their results may suggest some degree of subclinical cognitive decline that warrants further investigation or follow-up (all individuals are being followed up for the continuation of this study). Rapid forgetting, as measured by delayed-recall in different memory tasks has been proposed as an important neuropsychological marker for the early and differential diagnosis of dementia, in particular that of Alzheimer's type, the most prevalent one[21,22]. The measures of forgetting for distinguishing normal elderly individuals from mildly demented have the highest accuracy rates among all memory measures, according to Welsh et al.[23], who used a list-learning task of the Consortium to Estabilish a Registry for Alzheimer's Disease (CERAD) to compare normal elderly adults and mildly demented patients. Recognition of a list-learning test similar to RAVLT [California Verbal Learning Test] was also already documented to be impaired in mild dementia by Kramer et al.[24]. The use of memory self-evaluation questionnaires in everyday life has been criticized by Sunderland et al.[25], who carried out a similar experiment with a group of 60 year-old persons proceeding from the community. These authors have concluded that in spite of abnormal responses on the questionnaires, performance in tests was normal.

The fact that SMC in the elderly was related to a worse performance on RAVLT in our study suggests accuracy in metamemory, something that has been previously reported[26,27]. Wang et al.[7] studied the relationship between SMC, depression and cognitive performance in a predominantly illiterate population and demonstrated that even when age, sex and education were controlled, there was a relationship between SMC and worse performance in tests. The authors suggested that SMC do reflect an adequate perception of memory impairment, that is to say, of maintenance of the metamemory in the elderly. In our sample not all individuals with SMC had a higher score on MAC-Q (more than ¼) and not all individuals with higher scores on MAC-Q presented memory complaints when asked by the interviewer (almost ¼). Eliciting the individual's self perception of memory decline, through the use of questionnaires like MAC-Q, is possibly less accurate than the subjective feeling of a memory deficit. Our study nevertheless demonstrated a positive relationship between SMC and MAC-Q, a result that is in accordance to most studies in the literature[3,5,6,28].

The findings of this study should be interpreted with restraints. SMC, for instance, was not identified through spontaneous reporting, but otherwise by direct questioning. The authors decided for this procedure in order to mimic what is commonly done in clinical practice with elderly patients. This procedure however may have elicited a positive response in some individuals, increasing the number of people in the C group. The methodology and the size of the sample do not allow us to generalize the present results for the elderly population as a whole. Also, the sample consisted of volunteers for a memory study, not patients commonly seen in medical practice. Our results suggest that self-perception of memory impairment in everyday life maybe a useful indicator of actual or potential cognitive problems, at least in healthy and independent individuals from the community. Direct questioning seemed to be more predictive of memory impairment than the use of a self-report questionnaire. One possible explanation is that higher scores on MAC-Q addresses memory decline (since compares present memory functioning to the one when the individual was much younger) but not necessarily memory deficit, which is something totally different. A person may correctly identify a decline of his memory from late adolescence or early adulthood to senescence and yet do not have any functional impairment as a consequence. Several different factors may be related to this phenomenon: overestimation of previous memory abilities, actual superior memory abilities that have declined but are still in the normal range, different life demands upon memory in senescence, among others. SMC prompted by direct questioning in healthy elder individuals without risk factors for metamory impairment (mostly depression) should be considered an indicator of possible memory dysfunction, and a signal calling for the need of a more complete evaluation or follow-up.

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