The MNA Score in People Who Have Aged Successfully

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One of the main objectives of gerontological medicine is to assist people reaching retirement age to age successfully. As defined by Rowe & Khan [1, 2], successful aging encompasses three distinct domains: avoidance of disease and disability; maintenance of high physical and cognitive function, and sustained engagement in social and productive activities. More studies are needed which contrast successful aging with unsuccessful aging or with pathological conditions leading to poor health status. These studies will enable clinicians to become more aware of how to maintain or restore an acceptable degree of health to elderly patients.

Studies designed to examine the impact of good nutritional habits in maintaining the health status of elderly people have shown that assessing the degree of undernutrition in an elderly patient can be beneficial in the treatment of that patient [3, 4]. However, until recently there has not been a reliable, validated instrument to assess whether poor nutritional habits may be the cause of poor health or may possibly impede the restoration of good health in some elderly patients. The Mini Nutritional Assessment (MNA) was designed for this purpose. The MNA [5] is a standardized and validated instrument which can be easily administered in a short period of time to determine whether the patient may be at risk for undernutrition. In this chapter, we describe the results of using the MNA instrument in 330 elderly individuals enrolled in the New Mexico Aging Process Study (NMAPS) [6].

Materials and Methods

The NMAPS is a longitudinal, multidisciplinary investigation of age-related changes in nutritional status in relation to health and functional status of an elderly cohort. The characteristics and general inclusion criteria for the study are
MNA Score in People Who Have Aged Successfully

<table>
<thead>
<tr>
<th>Table 1. Description of the population studied in 1993</th>
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<tbody>
<tr>
<td>Number</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2. Four stage classification of the participants by health status and by disease (1990)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification 1 (C1)</td>
</tr>
<tr>
<td>Excellent</td>
</tr>
<tr>
<td>No history of medical or surgical illness</td>
</tr>
<tr>
<td>No HBP or hypothyroidism</td>
</tr>
<tr>
<td>No significant medications</td>
</tr>
<tr>
<td>Minimal balance or gait abnormalities</td>
</tr>
<tr>
<td>MMS &gt; 27</td>
</tr>
<tr>
<td>No deficit in IADL</td>
</tr>
</tbody>
</table>

MMS = Mini-mental state examination score; HBP = high blood pressure; IADL = independent activities of daily living.

described elsewhere [6]. It should be noted that the NMAPS is not a “representative” or “population-based” sample, but a cohort of independently living, relatively healthy, economically secure, well-educated, and highly cooperative elderly men and women. Table 1 describes the cohort examined in 1993.

A four-stage classification that defines the state of health of the elderly in the NMAPS was used for this study. The criteria used for this classification were medical history (defined major illnesses, previous major surgery resulting in disability, and present use of drug treatments), gait and balance disorders [7], and cognitive function (mini-mental state (MMSE) score) [8]. Health classification was as follows: C1 = excellent, C2 = good, C3 = frail, C4 = sick (Table 2). In
Table 3. Distribution over the different classes

<table>
<thead>
<tr>
<th></th>
<th>Excellent (C1)</th>
<th>Good (C2)</th>
<th>Frail (C3)</th>
<th>Sick (C4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>79 (23.9%)</td>
<td>159 (48.2%)</td>
<td>61 (18.5%)</td>
<td>31 (9.4%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>74.4 ± 5.7</td>
<td>76.3 ± 6.07</td>
<td>9.9 ± 6.6</td>
<td>80.5 ± 6.0</td>
</tr>
<tr>
<td>Male</td>
<td>33 (25.0%)</td>
<td>61 (46.2%)</td>
<td>22 (16.7%)</td>
<td>16 (12.1%)</td>
</tr>
<tr>
<td>Female</td>
<td>46 (23.2%)</td>
<td>98 (49.5%)</td>
<td>39 (19.7%)</td>
<td>15 (7.6%)</td>
</tr>
</tbody>
</table>

Table 4. Mini-Nutritional Assessment (MNA) scores and serum albumin concentrations

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNA (max. 30 pts)</td>
<td>27.7 ± 1.8</td>
<td>26.6 ± 2.2</td>
<td>25.7 ± 2.5</td>
<td>24.8 ± 2.8</td>
</tr>
<tr>
<td>Albumin (g/l)</td>
<td>41.2 ± 2.3</td>
<td>41.2 ± 2.7</td>
<td>41.0 ± 2.4</td>
<td>39.8 ± 2.9</td>
</tr>
</tbody>
</table>

addition, other information from the NMAPS participants, collected as part of routine yearly measurements, was also available, for example an assortment of biochemical tests. The MNA was administered to all of the NMAPS participants in 1993.

Statistical Analysis

We use analysis of variance to test for differences between groups in means of continuous variables, and the χ² test for group differences in frequencies for categorical variables. A probability (p) value of < 0.05 was considered significant.

Results

Table 3 shows the distribution of the four health classifications of the NMAPS participants by sex, along with mean ages in each classification. The highest percentage of participants was classified as being in good health (C2). We found that 72.2% of this cohort were either in good or excellent health by our classification. Mean age increased significantly from C1 to C4 as expected. No significant sex differences were found in any of the health classification categories.

Table 4 shows the mean MNA scores and standard deviations by health classification, along with serum albumin concentrations. The mean MNA score decreased significantly (p < 0.05) between those in excellent health status (C1) and those found to be sick (C4). Though mean serum albumin concentrations

63
were lower in the C4 category compared with the other three categories, this
decrease was not statistically significant. A much clearer differentiation between
health status and MNA score was found when we grouped those in excellent or
good health together (C1 + C2) and compared them with those in the frail or sick
category (C3 + C4; Table 5). Seventy-two percent of the participants in the
NMAPS were defined as being in good or excellent health (C1 + C2) and 28%
were found to be frail or sick (C3 + C4). There were significant differences
between these two groups in age and MNA.

Discussion

Rowe & Khan [1, 2] pointed out the need to distinguish “usual” aging (non-
disabled older persons: a non-pathologic but high-risk population, meaning there
are age-related alterations in functional or cognitive status) from the “successful
aging” (that is, people with a low probability of disease and disease-related dis-
ability, good functional and cognitive status, and active engagement in life). By
this distinction, Rowe & Khan hope to stimulate research into the criteria and
determinants of successful aging and identify proper targets for intervention to
attain more successful aging in elderly people.

In recent years, successful aging has become a familiar term among gerontolog-
ists [9–13]. Geriatric assessment appears useful in describing the successful aging
process. The relation between nutritional status and aging has been a subject of
growing interest for many years and now we have improved our knowledge on the
nutritional needs of elderly people. In the present study, we determined MNA
scores in the MNAPS population (n = 330), which we judged was primarily aging
successfully – that is, it was mainly composed of those in good or excellent health
for their age. The mean (SD) MNA score was significantly higher for those in good
and excellent health compared with those judged to be frail or sick: 27.0 (2.1) vs.
25.4 (2.6), respectively. The body mass index and albumin values were similar
between the two groups.

Table 5. Good and excellent health versus frail and sick health

<table>
<thead>
<tr>
<th></th>
<th>C1 + C2 (72%) (n = 238)</th>
<th>C3 + C4 (28%) (n = 92)</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>75.7</td>
<td>80.1</td>
<td>p = 0.0001</td>
</tr>
<tr>
<td>MNA (max. 30 pts)</td>
<td>27.0 ± 2.1</td>
<td>25.4 ± 2.4</td>
<td>p = 0.0001</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.2</td>
<td>25.2</td>
<td>p = 0.9172</td>
</tr>
<tr>
<td>Albumin (g/l)</td>
<td>41.2 ± 2.5</td>
<td>40.7 ± 2.1</td>
<td>p = 0.1016</td>
</tr>
</tbody>
</table>
Conclusions

We consider that an MNA score of <17 reflects protein-energy malnutrition, a score between 17 and 23.5 reflects risk of malnutrition, and >24 reflects good nutritional status for the elderly population. From our study, an MNA score of around 27 (2.1) seems to be related to successful aging, but more studies are needed to confirm this observation. Maybe this score of 27/30 is one of the criteria which should be present, among others, for the definition of a successful aging process.

References


Discussion

Dr. Camilla: If I understood you correctly, your study was a longitudinal one, although I believe you presented cross-sectional data. I think it is important for a successful evaluation of aging in relation to MNA to have information on lifestyle factors, including dietary habits. Could you comment on that?

Dr. Scheirlinckx: We did make a cross-sectional analysis in 1993 but I have no information on lifestyle factors.

Dr. Vellas: The aim of the study was only to obtain MNA scores in healthy elderly people. We know that the MNA score is around 27–28 in these people. Maybe this would be a suitable goal for people who age successfully.

Dr. Rea: I am still concerned about the MNA values in healthy old people. In our over-90 population – which is presumably composed of people who have aged successfully, since they have managed to reach that great age – our MNA scores were 23 for females and

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24 for males. It does worry me that you’re thinking in terms of scores of 27 or 28 in successful aging. Our experience is that the scores are a good deal lower than that.

Dr. Vellas: I don’t think that reaching the age of 90 is equivalent to successful aging. You can be 90 years old and frail. It would be important to have a full geriatric assessment in your population and to select only the 90-year-olds who are in good health as opposed to those who are really frail and see what the MNA score is in them. I expect your population includes people with gait and balance disorders, people on drug treatment, and people with diseases of various kinds.

Dr. Rea: If you look at our poster, you will find that there was only one person who was not able to walk independently.

Dr. Vellas: Yes, but walking independently does not rule out frailty. Are you sure your subjects were not on medication, and had no gait or balance disorder, or cognitive impairment?

Dr. Rea: Our population has no cognitive impairment, they have virtually no gait disturbance, and they are apparently healthy, although they are on drugs. About a third of them would be taking medication. I would argue that they have successfully aged. They may be frail, but they have successfully aged.

Dr. Chumlea: I think what Dr. Rea is bringing up is an interesting question. There does seem to be an age effect, with older people having a smaller MNA score. So there is confounding here that maybe needs to be corrected for, though I don’t know exactly how to do it.

Dr. Morley: I think the problem is how you define successful aging. There are clearly highly successful, highly functional people in the 90+ age range, who are still capable of doing things that many of us have never done or never even conceived we could do. These are the people who are truly successful at aging. Another group is the people who have diseases and are somewhat frail but are coping, and because they are coping they are getting to an older age. I don’t think of them as truly successful at aging. They have overcome problems, and they are living with problems. We have lots of 90-year-olds functioning fairly well in the community, but many are very frail. We need to know whether the people in the Irish group with low MNA scores have greater morbidity over period of time and die sooner than those who score higher. Only when we have those data will we be able to determine who are the truly successful ones.

Dr. Chumlea: I agree that a score of between 17 and 23 places the individual at risk, and may have important significance in people of 70–85. But once you get to 95 it’s impossible to have a score as high as 27. It’s bound to be depressed because of frailties. That does not mean that such people are not aging successfully, but there will be a decline with age which needs to be taken account of in the score.

Dr. Vellas: For this reason I think that 23.5 for a 90-year-old is not such a bad score. It’s the same as with the Mini Mental State score. If we look at people over 90, sometimes some of them can have a score of 26 or 27 on the MMS.

Dr. Rea: Our group were all over 28, and most of them 30. They are not mentally impaired.

Dr. Rubenstein: This discussion illustrates the importance of not relying on a number per se in all these screening tests. They are simply screening tests. The crucial thing is that when you notice a discrepancy between a score and what you think is happening clinically, you look at what the scale is actually saying. What are the items that are responsible for this fall off? Are they an age-related phenomenon, or a cultural difference? Is there something different about Ireland – or maybe something different about people in their 90s – that is pulling down the score? Is it only one or two items on the MNA? You need to look at those items rather than simply taking the number per se.

Dr. Vellas: We do know that people who are over 90 are at risk of malnutrition if they have some kind of disease.