ADMINISTERING THE “AHSP QUESTIONNAIRE” (APPETITE, HUNGER, SENSORY PERCEPTION) IN A GERIATRIC REHABILITATION CARE

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Abstract: Background: Frail elderly people, living in nursing homes, usually show a malnutrition state caused by an increased need of energy or an inadequate food intake. Among the causes leading to reduction of food intake in elderly people and consequently to malnutrition, is the loss of appetite, often marker of depression and alterations of taste and smell perception. Objective: The aim of this research is to verify the application of the AHSP Questionnaire and relate its score to nutritional state of a frail elderly population hospitalized in a geriatric rehabilitation care. Setting and Subjects: all patients of the “3rd Rehabilitation Department” of the Istituto Geriatrico “Villa delle Querce” Nemi (Rome-Italy). Methods: Informations, number and type of medical conditions, prescribed drugs, other parameters that can affect taste, smell, hunger and nutritional status, mood, cognitive and nutritional status have been collected from the clinical folders. To assess appetite, hunger smell and taste perception had been submitted the AHSP Questionnaire. Results: The AHSP Questionnaire had been administered only to 44 of the 103 patients present at the survey because of the high prevalence of cognitive impairment. AHSP score is lower in presence of malnutrition assessed with MNA (Mini Nutritional Assessment). MNA, expressed as proportional score, seems to present a clear correlation with AHSP’s (r = 0.59; p = 0.000). Conclusion: The results achieved show the scarce adaptability of the AHSP Questionnaire to frail elderly people living in geriatric rehabilitation care. MNA is at the moment the most reliable tool to single out dietary deficiency on geriatrics population.

Key words: Aging, anorexia, impairment, nursing home, taste, smell.

Introduction

Elderly people showing interest towards food, nourishment and keeping a good appetite, in most cases still are vital human beings with interests and quite independent. A convenient nutritional status helps the achievement of such a condition and it is absolutely essential when recovering from acute illnesses (1). Frail elderly people, especially whether living in nursing homes or likewise, usually show a malnutrition state (2, 3) caused by an increased need of energy and nutrients or by inadequate food intake. Intake reduction may depend on several factors, i.e. social factors (that is financial problems, loneliness, partial or total impossibility to buy food and/or prepare meals), physical factors (such as anorexia, reduction of required intake, immobility), or psychical ones (depression, cognitive deterioration, pathologic events as hyper-catabolism caused by fractures, septic conditions, cerebrovascular problems ...). Among the causes leading to reduction of food intake in elderly people and consequently to malnutrition, is the loss of appetite which is, by the way, one of the most common marker of depression and alterations of taste and smell perception (4). A decline of these sensory perceptions is frequently due to aging, the use of prescribed drugs or to pathologies (5, 6).

In an elderly population, to assess appetite, hunger, taste and smell perception which are considered the earliest symptoms of anorexia in the elderly, de Jong et al. have proposed the “Appetite, Hunger, Sensory Perception Questionnaire (AHSP) (7, 8). This tool represents a new method of approaching the inquiries on nutrition because instead of focusing on information concerning quality and quantities of foods as well as frequency of their intake, it is based on the self-perception of hunger and appetite besides smell and taste. Apart from AHSP only MNA, elaborated to single out the subjects more liable to malnutrition, also provides a question regarding feelings of hunger (9).

The aim of this research is to verify the possible application of AHSP and to relate its score to the nutritional state of a frail elderly population hospitalized in a geriatric rehabilitation care.

Methods

Study population

The survey includes all the patients of the “3rd Rehabilitation Department” of the Istituto Geriatrico “Villa delle Querce” Nemi (Rome-Italy), in the period of March-April 2002, for a total of 103 persons, (35 M and 68 F; average age 81.9 ± 10 and 79.9 ± 9 years).

Achieved Data

Informations have been collected from the clinical folders of the patients enrolled in the study:

1. Number and type of medical conditions and prescribed drugs. We especially looked at pathologies (type 2 diabetes, Parkinson’s disease, neoplastic disease, liver or chronic renal
failure, arterial hypertension and hypothyroidism) or drugs
(corticosteroids, ACE-inhibitors, Ca-blockers, oral antidiabetic
drugs, L-dopa, coronary-dilatators) able to affect taste and
smell (4)

2. Other parameters that can affect taste, smell, hunger and
nutritional status i.e. eating between meals, taking dietary
supplements, smoking cigarettes, natural teeth, use of a
dentures and its performance during mastication.

3. Cognitive status by means of the “Short Portable Mental
Status Questionnaire” (SPMSQ) (10)

4. Mood according to the Cornell Scale of Depression (11,
12)

5. Functional status according to the ADL – “Activities of
Daily Living” test (13)

6. Nutritional status by:
- examining anthropometric indices [stature, weight, arm
circumference (AC), triceps skinfold thickness (TSF)] and
biological parameters [albumin, transferrin, cholesterol,
cholinesterase, lymphocytes, C-reactive protein (CRP),
mucoprotein]. Body Mass Index [BMI = weight (Kg) / (stature
(m))] and Mid-Upper Arm Muscle Circumference [MAMC
(cm) = AC (cm) – (p * TSF (cm))] have been calculated.
- Mini Nutritional Assessment (MNA) (9): patients were
classified into three risk categories according to their MNA,
expressed as proportional score (14):
  1. malnourished: MNA < 0.56
  2. at risk of malnutrition : 0.56 ≤ MNA < 0.79
  3. well-nourished: MNA ≥ 0.8

The anthropometric measurements were performed by a
single trained operator according to the Standard Manual for
Anthropometric Measures (15). The subjects were measured
barefoot with lightweight clothing. Weight was measured to
the nearest 0.1 kg on a SECA (Hamburg, Germany) weighing scale
and stature was measured on a wall-mounted stadiometer to
the nearest 0.5 cm (SECA, Hamburg, Germany). To measure stature the barefoot subjects were requested to stand straight on a
horizontal surface, heels together, looking straight forward.
Circumferences were measured to the nearest 0.1 cm with a
cloth tape, and skinfold thickness was measured to the nearest
0.2 mm with a Harpenden skinfold caliper (British Indicators
Ltd, St Albans, Herts, UK) on the dominant arm.

The concentrations of biological parameter in serum were
determined by routine methods with conventional commercial
cots obtained from ABX Italia (Rome, Italy). Peripheral venous
blood was collected from antecubital vein after an overnight
fast. The laboratory tests were carried out using a COBAS-
MIRA analyser at the Laboratory of the Istituto Geriatrico
“Villa delle Querce” – Nemi (Rome, Italy). Lower limits of
normality for nutritional parameters were defined as: MAMC =
22 cm for men and = 18.9 cm for women; TSF = 5.2 mm for
men and = 9.7 mm for women (average values for Italian
samples enrolled in the SENECA study) (15); albumin = 30 g/l,
transferrin = 1.5 g/l, lymphocytes = 1200 #/mm_3 (“Guide Lines
of the Italian Society for Enteral and Parenteral Nutrition”
(17).

**Appetite, Hunger, Sensory Perception Questionnaire
(AHSP)**

To verify the presence of any change in appetite, hunger and
taste and smell perceptions in this sampling population, the
AHSP, a tool developed by de Jong (7, 8), has been utilized.
The original version of this questionnaire was in English and it
has been translated into Italian for this very purpose.

AHSP consists of 29 questions with diversified answers
centered on a the self-assessment of the energy and
macronutrients intake, hunger sensation, appetite, taste and
smell both currently as well as in previous times.

The questionnaire is divided into 5 sections:
- Present Taste Perception: 8 items, range 8 to 40.
- Appetite: 6 items, range 6 to 30.
- Present Smell perception: 3 items, range 3 to 15.
- Present Smell perception compared to the past: 3 items,
  range 3 to 15.
- Daily feelings of Hunger: 9 items, range 9 to 45.

For each item the person interviewed can chose among 5
possible variables and for any answer the score goes from 1 to
5. A low score would indicate a deterioration while an high
score would indicate an adequate perception (7, 8).

**Data analysis**

1. To verify the possibility of using the AHSP questionnaire,
the proportion of responding patients among the total sampling
has been considered; afterwards, this datum has been correlated
to cognitive status, mood, nutritional status, number of
pathologies and age of the patient.

2. To determine the reliability of this test, the total score and
that of each section has been correlated to the nutritional state.

3. The prevalence of factors capable to affect taste and
olfactory sensation, such as pathologies, prescribed drugs,
eating between meals, taking dietary supplements, smoking
cigarettes, natural teeth, use and performance of dentures
during mastication, has been calculated; it has also been
verified if this prevalence was or was not correlated to the
AHSP scores (in total and for each section).

Data are expressed as means ± standard deviation. Linear
regression analysis and correlation coefficient (Pearson’s r)
were used to test the association between the AHSP score and
nutritional parameters. Student’s t test and ANOVA were used
to assess differences in group means and Pearson’s c² to
calculate the observed frequencies of categories to the expected
frequencies if the null hypothesis were true. Statistical
significance was set at the p < 0.05 level. The data were
analysed with the SPSS 9.0 for Windows (1999 SPSS Inc.)
statistical software.

**Results**

The general characteristics of the sampling population are
summarized in the Table No.1. The level of comorbidity and
The prevalence of cognitive impairment, dependence on daily activities and malnutrition were very high.

### Table 1
Overall characteristics of the studied population

<table>
<thead>
<tr>
<th>Subjects</th>
<th>mean</th>
<th>women</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>Mean ± SD</td>
<td>81.9 ± 10</td>
<td>79.9 ± 9</td>
</tr>
<tr>
<td>Medical conditions</td>
<td>Mean ± SD</td>
<td>3.7 ± 1.6</td>
<td>3.8 ± 1.6</td>
</tr>
<tr>
<td>Prescribed drugs</td>
<td>Mean ± SD</td>
<td>5.2 ± 2.5</td>
<td>6.6 ± 2.8</td>
</tr>
<tr>
<td>SPMSQ*</td>
<td>%</td>
<td>34.3/17.1</td>
<td>23.5/20.6</td>
</tr>
<tr>
<td>ADL*</td>
<td>%</td>
<td>87.9</td>
<td>74.2</td>
</tr>
<tr>
<td>Cornell DS</td>
<td>Mean ± SD</td>
<td>6.1 ± 5.5</td>
<td>7.8 ± 6.9</td>
</tr>
<tr>
<td>Remaining tests</td>
<td>Mean ± SD</td>
<td>7.4 ± 8.5</td>
<td>6.7 ± 8.7</td>
</tr>
<tr>
<td>AHSP*</td>
<td>%</td>
<td>95.9 ± 14</td>
<td>94.8 ± 16</td>
</tr>
<tr>
<td>TSF</td>
<td>%</td>
<td>11.4</td>
<td>17.6</td>
</tr>
<tr>
<td>M: &lt;5.2mm;</td>
<td>W: &lt;7.7mm</td>
<td>34.3</td>
<td>23.5</td>
</tr>
<tr>
<td>M: &lt;22cm;</td>
<td>W: &lt;8.9cm</td>
<td>29.9</td>
<td>29.9</td>
</tr>
<tr>
<td>Albumin &lt; 30 g/l</td>
<td>%</td>
<td>8.6</td>
<td>5.9</td>
</tr>
<tr>
<td>&lt; 150mg/dl</td>
<td>%</td>
<td>25.7</td>
<td>27.3</td>
</tr>
<tr>
<td>&lt; 1200U/ml</td>
<td>MNA</td>
<td>Well nourished</td>
<td>7.2</td>
</tr>
<tr>
<td>At risk of malnutrition</td>
<td>%</td>
<td>60.7</td>
<td>43.3</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>%</td>
<td>32.1</td>
<td>46.7</td>
</tr>
</tbody>
</table>

Legend: * = Moderate / Severe cognitive impairment according to the SPMSQ (Short Portable Mental Status Questionnaire); # = done = ADL (Activities of Daily Living); Cornell DS: Cornell Scale for Depression; * = AHSP (Appetite, Hunger, Sensory Perception Questionnaire) responder; TSF: triceps skinfold thickness; MAMC = Mid-upper Arm Muscle Circumference; MNA = Mini Nutritional Assessment.

It was possible to submit the AHSP questionnaire only to 44 of the 103 patients present at the moment of the survey (42.7%). In the Table No. 2 the characteristics of the responder group versus the non-responder one have been compared.

### Table 2
Clinical and nutritional characteristics of responders and non-responders subjects to the AHSP questionnaire

<table>
<thead>
<tr>
<th>Subjects</th>
<th>AHSP responders</th>
<th>non responders</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>76.3 ± 10</td>
<td>83.8 ± 8</td>
<td>t=4.2</td>
</tr>
<tr>
<td>Medical conditions</td>
<td>4.1 ± 1.7</td>
<td>3.6 ± 1.4</td>
<td>t=1.7</td>
</tr>
<tr>
<td>Prescribed drugs</td>
<td>6.7 ± 3.3</td>
<td>5.8 ± 2.1</td>
<td>t=1.7</td>
</tr>
<tr>
<td>SPMSQ (score)</td>
<td>2.4 ± 2.3</td>
<td>5.9 ± 3.1</td>
<td>t=6.3</td>
</tr>
<tr>
<td>Cornell DS (score)</td>
<td>8.6 ± 5.7</td>
<td>5.6 ± 9</td>
<td>t=2.0</td>
</tr>
<tr>
<td>ADL (lost functions)</td>
<td>6.0 ± 5.3</td>
<td>5.3 ± 2</td>
<td>t=2.4</td>
</tr>
<tr>
<td>MNA (% malnutrition)</td>
<td>31.6</td>
<td>50</td>
<td>c²=3.6</td>
</tr>
<tr>
<td>(proportional score)</td>
<td>0.62 ± 0.2</td>
<td>0.55 ± 0.1</td>
<td>t=2.2</td>
</tr>
<tr>
<td>Albumin (mg/dl)</td>
<td>4.3+/0.6</td>
<td>3.9+/0.5</td>
<td>t=3.5</td>
</tr>
<tr>
<td>Transferin (mg/dl)</td>
<td>229+/48</td>
<td>226+/62</td>
<td>t=0.3</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>197+/47</td>
<td>179+/41</td>
<td>t=2.1</td>
</tr>
<tr>
<td>Cholinesterase (U/l)</td>
<td>7117+/2570</td>
<td>5360+/1915</td>
<td>t=4.0</td>
</tr>
</tbody>
</table>

Legend: AHSP: Appetite, Hunger, Sensory Perception Questionnaire; SPMSQ: Short Portable Mental Status Questionnaire; Cornell DS: Cornell Scale for Depression; ADL: Activities of Daily Living; MNA: Mini Nutritional Assessment.

The first group of patients presents a number of pathologies (4.1 ± 1.7 vs. 3.6 ± 1.4) and is prescribed a number of drugs (6.7+/− 3.3 vs. 5.8+/− 2.1) larger than that of the AHSP non-respondent group. The non-responder subjects were more dependent in the ADL, had a higher prevalence of moderate-severe cognitive impairment and a lower score to Cornell DS. In this group malnutrition prevalence is higher: 50% versus 31.6% according to MNA.

The Table No. 3 presents the results of the comparison between AHSP score and nutritional state. AHSP score is lower in presence of malnutrition assessed with MNA. MNA, expressed as proportional score, seems to present a clear correlation with AHSP's (r = 0.59; p = 0.000). As far as any single nutritional parameter is concerned, there is a significant correlation between the total AHSP score and albumin (r = 0.31) and cholinesterase (r = 0.43). No correlation was found among the single sections of AHSP and the nutritional status.

### Table 3
AHSP questionnaire score and Nutritional Status

<table>
<thead>
<tr>
<th>AHSP score</th>
<th>(score x DS)</th>
<th>MNA</th>
<th>Well nourished</th>
<th>At risk of malnutrition</th>
<th>Malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>103.12 ± 12</td>
<td>F=11.6</td>
<td>p=0.000</td>
<td>99.6 ± 11</td>
<td>79.2 ± 15</td>
</tr>
</tbody>
</table>


The comparison between AHSP score and the factors able to negatively affect taste, smell or appetite shows that there is a significant correlation between the total AHSP score and autonomy in eating: AHSP score was lower in subjects who were unable to eat without assistance (78.7+/−15 vs 100+/−12; t=8.5, p=0.001). We found also a correlation between a low AHSP score and the assumption of certain prescribed drugs as corticosteroids, coronary dilators and L-dopa. By the same way MNA proportional scores were lower for subjects assuming coronary dilators and L-Dopa, but not for those treated with corticosteroids (table 4). On the other hand no correlation has been found among the single sections of AHSP and the presence of factors negatively affecting taste, smell or appetite.

### Table 4
Prescribed drugs versus AHSP questionnaire and MNA proportional scores

<table>
<thead>
<tr>
<th>AHSP score</th>
<th>MNA proportional score</th>
</tr>
</thead>
<tbody>
<tr>
<td>drug</td>
<td>prescribed</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>80.0+/−6</td>
</tr>
<tr>
<td>Coronary-dilators</td>
<td>79.0+/−14</td>
</tr>
<tr>
<td>L-dopa</td>
<td>88.0+/−16</td>
</tr>
</tbody>
</table>

AHSP QUESTIONNAIRE

Discussion

The results achieved with this study show the scarce adaptability of the AHSP questionnaire to the sample of population used for this investigation. The main elements which have determined this result, and above all the self-management of the questionnaire by the patients, have been the high physical dependence, the reduced sight level and in certain cases the generally low cultural level of the subjects examined. The negative influence of these elements have been only partially counterbalanced by entrusting a trained interviewer to perform the questionnaire to the patients.

The cognitive deterioration as well as a tendency to depression have been other important factors that have limited the efficacy of the test. Indeed, we have noticed a higher number of mistakes in the SPMSQ as well as a lower score with Cornell’s DS in the patients who could not follow AHSP. Contrary to the samples selected for the Mathey MF study (8), most of the subjects in our population have difficulties in understanding and answering the questions. At the same time, in this group there was a lower number of pathologies and of prescribed drugs. It is evident that it was not the general clinical aspect, tendentially quite better in the AHSP non-responding group, to affect the applicability of the test but the cognitive deterioration grade and the mood of the patients. Even in this case our population differs from the Mathey’s one (8).

Mainly, the prevalence of a high level of malnutrition presented by the non-responder group represents a limit for the use of the AHSP questionnaire. Clearly, if a test is designed to detect the possible factors influencing senile anorexia and thereby malnutrition, it must be adaptable to the populations where the risk factors for malnutrition are more prevalent and therefore to subjects with cognitive or physical impairment.

Differently from what M-F Mathey et al. have reported (8), the patients with slight or no cognitive deterioration who could answer the questions found the task quite difficult, thus underlining critical points in the structure of the questionnaire. Cooperation by the patients was low for several reasons; first of all the number of items requiring quite a long time to answer (over 15 minutes). Moreover the patients affirmed they had the sensation of being presented with repetitive questions which had already been answered in some other way. These difficulties have been partly overcome drawing up similar questions in a different succession with respect to the original sequence of the AHSP questionnaire.

Another determining factor for the reduced compliance to this test was the difficulty in comprehending the previewed items. In this case, the questions have been reformulated using a simpler language than that of the literal translation from English and examples have been suggested. For instance the 3rd item regarding the current capacity to distinguish different odors reads: “nowadays I am not able to identify a lot of odors” and the interviewer suggested “at the moment can you recognize the mint odor?, and the basil’s?”. Nevertheless, more than half the patients couldn’t give a reliable answer.

Further, notwithstanding the examiner had specified that the term “past” was related to a period when the patients were less than 50 years old (as the authors suggested in preparing the questionnaire), any time the term “past” was used, thus asking to make a comparison between the present state and a previous one, the time identified by the patients was quite far from today’s and generally perceived as their youth. They showed a temporal confusion and a low cognition of the evolving of things in more closer times. Then the interviewer made the questions easier; the 7th item of the “taste section” says: “in former days I enjoyed eating” and the question was changed into “when you were 35 – 45 years old did you like eating as today?, more ?, less?, how much more ?, how much less?”.

Nevertheless, in the responder group to the AHSP questionnaire, there was a good correlation with the patient nutritional state, as affirmed by the authors. A significant correlation between the AHSP score and the nutritional state was verified. The AHSP score reduces according to the nutritional state aggravation while it is higher with normal nutritional status, although not equal to the maximum obtainable. This result may indicate a real deterioration of the variable elements i.e. appetite, hunger, taste and smell when compared with the past but not still to determine a meaningful reduction of the feeding intake and consequently a state of malnutrition.

Also, AHSP score resulted to be significantly correlated to the nutritional biological parameters such as cholinesterase, (which sensitivity and specificity can be compared to that of albumin) (17) and albumin (which is indicative of the protein supply and thereby considered one of the most reliable markers for the identification of malnutrition). It is known that albumin values are, on the average, lower in elderly population (18) because of their reduced capability to produce proteins while they tend to eliminate it at a higher rate (19-21); serum albumin level is also affected by a plethora of factors which results in low sensitivity and specificity to changes in nutritional status (22). Nonetheless, albumin is considered a nutritional prognostic parameter of the exposure to diseases, period of hospitalization, chances of re-hospitalization, and death and used as standard-reference for the validation of nutritional assessment tools (2, 3, 23).

The intrinsic validity of this test has been confirmed by the correlation, appreciated in our sampling population, between AHSP score and variables recorded in literature (5), capable to prejudice testing and smelling sensations as well as appetite and consequently elderly subjects’ food intake. We found a correlation between a low AHSP score and a dependence in eating or the consumption of drugs, such as coronary vasodilators, corticosteroids and L-dopa, that are known to be able to affect taste, smell and appetite. Likewise patients treated with L-dopa or coronary vasodilators had a lower MNA proportional score. When such drugs cannot be avoided, their use demand a particular attention to the patients’ feeding intake.
and the choice of selective strategies to maintain this intake satisfactory (5, 6, 24).

The results we obtained may suggest some considerations on the possible use of the AHSP questionnaire with elderly, frail patients. One the main data we noticed is the high prevalence of malnutrition in the non-responding group. Nutritional status may influence rehabilitation program efficacy and therefore the exposure to diseases and risk of death. Unfortunately AHSP, whose results are significantly related to MNA, although being a qualified tool, appears to be extremely unsuitable in a population, where the prevalence of malnutrition is quite high (2, 3). We think that AHSP may be a valuable tool for a selected population, but it is unfeasible for a multidimensional analysis on frail elderly people, both for its insufficient applicability and the time required.

On the other hand, considering the sensory variances involved in determining intake reduction, it is extremely urgent to detect those elements (as for example the deterioration of the tasting and smelling capacity) that can affect feeding intake. The aim is to prevent, also modifying the composition and flavour of foods, the loss of appetite which can be caused by the degeneration of the sensory perceptions.

Thereupon, we think that MNA is at the moment the most reliable tool to single out dietary deficiency on geriatrics population and select those subjects needing a closer examination. For this second purpose, in our opinion, more sensible tools must be used both to assess nutritional state (anthropometry and biochemical parameters) and to detect risk factors for the reduction of food intake. In particular, as far as the analysis of the taste and smell is concerned, it is quite probable that the use of an objective test (which results cannot be disqualified by the cognitive state or other functional or clinical parameters of the patients) be more suitable to determine the perception threshold for sweet taste (glucose), salted taste (sodium chloride), bitter taste (caffeine) and for smelling sensation (benzaldehyde, geraniol, methyl salicylate, n-caproic acid).

References

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