The validity of Mini Nutritional Assessment Short-Form (MNA-SF) questionnaire in screening malnutrition among elderly aged 60 years and above in urban Coimbatore

Anil C Mathew[1*], Jomy Jose [2], Athira S[2], M Vijayakumar [3]

[1]Professor of Biostatistics, Department of Community Medicine, PSG Institute of Medical Sciences and Research, Coimbatore, India
[2]Trainee Biostatistician, Department of Biostatistics, St. Thomas College, Pala, Arunapuram, India
[3]Community Medicine PG 3rd Year, Department of Community Medicine, PSG Institute of Medical Sciences and Research, Coimbatore, India

ABSTRACT

Malnutrition in old age is a significant problem. Mini Nutritional Assessment is a widely used international questionnaire to evaluate nutritional status of elderly. However its length limits its usefulness for screening. Rubenstein and colleagues developed a six question MNA Short-Form (MNA-SF). Later Kaiser et al. proposed top 10 revised versions of MNA-SF. The aim of the present study is to check the validity of MNA-SF proposed by Rubenstein and colleagues and further evaluate the top 10 revised combinations suggested by Kaiser *et al*.

Keywords: Malnutrition, MNA Questionnaire, MNA-SF, Validity.

Introduction

WHO defines malnutrition as "Malnutrition is the condition that develops when the body does not get the right amount of the vitamins, minerals, and other nutrients it needs to maintain healthy tissues and organ function".[1] The Mini Nutritional Assessment (MNA) is a short, valid nutritional screening tool for free-living and clinically relevant elderly population.[2] The Mini Nutritional Assessment (MNA) questionnaire contains geriatric-specific assessment questions related to nutritional and health conditions, independence, quality of life, cognition, mobility and subjective health.[3]The MNA is recommended for routine geriatric assessments by the European Society for Clinical Nutrition and Metabolism (ESPEN). [2] In India also, it is widely accepted in screening malnutrition among elderly. However there are many practical difficulties in implementing the full MNA such as Body Mass Index (BMI) calculation which needs weighing and height measurements and the number of unanswered questions is high in case of full MNA.[3]

**Correspondence*
Anil C Mathew
Professor of Biostatistics, Department of Community Medicine, PSG Institute of Medical Sciences and Research, Coimbatore, India
E Mail: anilpsgmet@gmail.com

To reduce this burden, Rubenstein and colleagues developed a six question MNA short-form (MNA-SF) by identifying a subset of questions from the full MNA that had high sensitivity, specificity and correlation to the full MNA.[1, 2]Later Kaiser et al. [4] proposed top 10 revised versions of MNA-SF from various combinations of 6 items from 18 items in the full MNA.[5] However these were not evaluated in the Indian context. The aim of the present study is to revise the MNA-SF by addressing the following points which form the objective of our study (1) Is the MNA-SF developed by Rubenstein and colleagues still valid (2) Further evaluation of top10 revised combinations suggested by Kaiser *et al*.

Materials and Methods

A.Sample size and Study design

For this study with an expected sensitivity of 90% with α = 0.05.The minimum sample size required is n= (4×90×10)/9×9 =44.The present study is a pooled analysis of previously collected data in the year 2014 from a study for screening malnutrition in the elderly population at the urban health center of PSG Institute of Medical Sciences and Research (PSGIMSR) used as MNA database. The urban health center of PSG Institute of Medical Science and Research has 6 areas

on which 3 areas were randomly selected. The selected areas were HUDCO, AD colony, Pattallamman Koil Street. The total numbers of households in these 3 areas were 762. In 565 houses, there were no elderly person and non-response was obtained in 43 houses. Hence we surveyed 154 households and 190 elderly were interviewed. They were asked about demographic, medical history, medication use and lifestyle. Some of the responses were obtained from the relatives. All elderly people aged 60 years and above residents at HUDCO Colony, AD colony and Pattallamman Koil Street were included in the study. Those who were too sick, those who were not present at time of visit, those who could not stand unsupported due to debility were excluded from this study. Approval for the study was obtained from Institutional Human Ethics Committee (IHEC). Written informed consent was obtained from each patient.

B.Measures of Nutritional Status

Nutritional status was assessed with Mini Nutritional Assessment (MNA), a validated questionnaire for older individuals. The questionnaire consists of 18 questions clustered in 4 sections: anthropometric assessment (weight, height, weight loss); general assessment (living situation, medicine use, mobility); dietary assessment (number of meals, food and fluid intake and autonomy of feeding) and subjective assessment (self-perception of health and nutritional status).The maximum score of 30 can be obtained. The Mini Nutritional Assessment questionnaire included 18 items such as Chewing Difficulty (CHEWDIFF), Weight Loss (WEIGHTLOSS),Mobility (MOBILITY) ,Stress (STRESS),Dementia (DEMENTIA),Body Mass Index(BMI),Living Independently (LIVEIND),Drug Consumption(DRUGCON),SkinUlcer(SKINULCER), FullMeal(FULLMEAL),ProteinIntake(PINTAKE),FruitIntake(FINTAKE),FluidIntake(FINTAKE),Feeding(FEEDING),SelfNutrition(SELFNUT),HealthStatus(HSTATUS),Mid Arm Circumference (MC) and Calf Circumference (CC).Chewing difficultly was classified as having moderate to severe decrease in food intake vs. No decrease in food intake. Weight loss categorized as weight loss >3 Kg vs. No weight loss. Mobility classification was Chair/Bed ridden vs. Goes out. Stress classified as Yes vs. No. Dementia was assessed as mild to severe dementia vs. no psychological problems. BMI classified as $<23Kg/m^2$vs. $\geq 3Kg/m^2$.Living independently was categorized as Yes vs. No. Drug consumption was assessed as Yes vs. No. Skin ulcer classified as Yes vs. No. Full meal categorized as < 3 meals vs. 3 meals. Protein intake was assessed as Yes vs. No. Fruit intake classified as Yes vs. No. Fluid intake categorized as ≤ 5 cups vs.> 5 cups. Feeding status was assessed as unable to feed without assistance vs. self-fed without difficulty. Self-Nutrition was classified as view oneself as being malnourished vs. view one as having no nutritional problem. Health status classified as not good vs. better. Mid Arm Circumference categorized as < 22 cm vs. ≥ 22 cm. Calf Circumference classified as < 31 cm vs. ≥ 31 cm.

Statistical Methods

The score for each MNA-SF version is calculated using the original weight of each of the included questions. We classified the result categories of MNA-SF ≥12 points as normal and not at risk. MNA-SF ≤ 11 points defined as possible malnutrition. Result categories of full MNA: 24-30 points defined as well-nourished, 17-23.5 points is at risk of malnutrition and 0-16.5 points as malnourished. The version of the MNA-SF is ranked according to the diagnostic measures sensitivity, specificity and Youden index (sensitivity+specificity-1) of at least 0.7 indicated good overall diagnostic accuracy. The highest ranking coefficients for the possible revised MNA-SF as suggested by Kaiser et al will be compared to full MNA using sensitivity as the primary ranking criterion.

Results

For validating Rubenstein MNA-SF we calculated sensitivity, specificity and Youden index of each item to the malnutrition similar procedure was adopted for Full MNA. (Table 1). We checked top 10 revised versions of Kaiser et al MNA-SF using our data and the results are tabulated in (Table 2).

Table 1: Diagnostic Characteristics Relative to Clinical Nutritional Status

	Sensitivity	Specificity	Youden index
A. CHEWDIFF	0.58	0.96	0.55
B. WEIGHTLOSS	0.66	0.98	0.64
C. MOBILITY	0.71	0.83	0.54
D. STRESS	0.50	0.81	0.31

E. DEMENTIA	0.26	0.89	0.15
F. BMI	0.62	0.98	0.60
G. LIVEIND	0.25	0.82	0.06
H. DRUGCON	0.86	0.79	0.65
I. SKINULCER	0.44	0.82	0.26
J. FULLMEAL	0.85	0.72	0.56
K. PINTAKE	0.74	0.93	0.67
L. FRUITINT	0.36	0.83	0.19
M. FLUIDINT	0.50	0.80	0.30
N. FEEDING	0.33	0.83	0.16
O. SELFNUT	0.29	0.95	0.24
P. HSTATUS	0.48	0.99	0.47
Q. MC	0.20	0.94	0.14
R. CC	0.54	0.99	0.53
Full MNA	0.62	0.87	0.49

Table 2: Top ten revised versions of the MNA-SF compared to the full MNA

Rank	Items	Sensitivity	Specificity	Youden Index
1	B-C-D-E-F-N	0.61	0.87	0 .48
2	A-B-C-D-E-F Original MNA-SF	0.61	0.89	0.51
3	B-C-D-E-F-L	0.61	0.87	0.48
4	B-C-D-E-F-J	0.69	0.86	0.55
5	B-C-D-E-F-K	0.65	0.88	0.54
6	B-C-D-E-F-I	0.62	0.87	0.48
7	B-C-D-E-F-M	0.62	0.86	0.48
8	B-C-D-E-F-R	0.58	0.87	0.46
9	A-B-C-D-E-R	0.59	0.89	0.49
10	A-B-C-E-F-L	0.61	0.90	0.50

Discussion

We selected items that correlated well with full MNA and had good individual characteristics that are high sensitivity, specificity and Youden index based on independent assessment of nutritional status. The combination Weight loss (B), Mobility (C) – Stress (D) – Dementia (E) – BMI (F) and Full meal (J) had the highest ranking and a marginally higher sensitivity of 0.6925than the original MNA-SF.The original MNA-SF combination consists of chewing difficulty (A) – weight loss (B) – mobility (C) – stress (D) – dementia (E) and BMI (F) showed sensitivity of 0.6134. However the specificity and Youden index were identical with MNA-SF. This small gain in sensitivity did not warrant changing the original MNA-SF. This confirms that the original MNA-SF is valid and compares well against the full MNA instrument.

Conclusion

The Mini Nutritional Assessment–Short Form (MNA-SF) developed by Rubenstein and colleagues is found to be valid. Top 10 revised versions suggested by Kaiser et al is also evaluated for our data and found to be valid.

Acknowledgements

The authors are extremely thankful to Dr.S Ramalingam, Principal, PSG Institute of Medical Sciences and Research for permitting us to do this study. We are grateful to Dr.Thomas V. Chacko, Professor and Head of Department of Community Medicine, PSG Institute of Medical Sciences and Research, for his constant support and encouragement for the successful completion of the study.

References

1. De Onis M, Monteiro CA, Akre J, Clugston G The worldwide magnitude of protein-energy malnutrition: an overview from the WHO Global Database on Child Growth. Bulletin of the World Health Organization, 1993;71:703−712.

2. Rubenstein L, Harker J, Salvà A, Guigoz Y & Vellas B Screening for Undernutrition in Geriatric Practice: Developing the Short-Form Mini-Nutritional Assessment (MNA-SF).Journals of Gerontology Series A: Biological Sciences and Medical Sciences2001, 56:M366-M372
3. Vellas B.The Mini-Nutritional Assessment and its use in the grading of nutritional status of elderly patients. Nutrition, 1999;15:116-122.
4. Kaiser MJ, Bauer JM, Ramsch C, et al. Validation of the Mini Nutritional Assessment Short-Form (MNA®-SF): A practical tool for identification of nutritional status. J Nutr Health Aging 2009; 13:782-788.
5. Guigoz Y. The Mini-Nutritional Assessment (MNA®) Review of the Literature - What does it tell us, J Nutr Health Aging 20

Source of Support: Nil
Conflict of Interest: None