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RESEARCH ARTICLE

Reliability of Mini-Nutritional Assessment Scale in Rural Setup of a Tertiary Health Care Hospital in Central India

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Abstract

A three month cross-sectional study was aimed at determining the reliability of mini-nutritional status scale in the field practice area of rural health training centre of Jawaharlal Nehru Medical College, Wardha, Maharashtra was carried out. Totally 80 participants were included in the study, of which 37 were males and 43 were females. Inter-observer reliability was calculated using two pre-trained nurses, visiting the elderly who had utilized the health care services from the rural health training centre in the last one month duration, by house to house visit and recorded the information as per Mini-Nutritional Assessment (MNA) scale. The follow up visit, after the first visit of Auxiliary Nurse Midwifery (ANM) was done exactly after one month and again the data was recorded in the form of MNA scale. The data collected was analyzed for inter-observer variations using kappa statistics. Oral consent was obtained from the participants. Mean score was 19.6 and 20.4, with standard deviation of 2.45 and 3.05 was obtained. According to kappa index, test-retest reliability for a stratified total MNA was 0.78 for 18 ordinals; it was nominal items, almost perfect, or substantial in 12 items. In 5 items, it was moderate to fair and in 1 item it was slight. MNA has a good level of reliability and reproducibility according to its internal consistency.

Keywords: Cross-sectional study, mini-nutritional assessment scale, Inter-observer reliability, kappa index.

Introduction

Deterioration of the nutritional status is affected by disease, especially among the elderly (Kagansky *et al.,* 2005). Nutrition is a key element in geriatric health and nutritional screening/assessment is a key component in comprehensive geriatric evaluation. Timely screening can help, detect early signs of nutritional imbalance and enable intervention to prevent emerging nutritional problems. There are at least 40 screening and assessment tools for subjective nutritional status assessments and some are for the general population and others for specific populations (Jones, 2002) like malnutrition universal screening tool (MUST), minimal eating observation and nutrition form (MEONF I and II), mini-nutritional assessment (MNA), subjective global assessment developed by Barker *et al.* (1982), prognostic nutritional index and Detsky index (Ulander *et al.,* 1993). The Nutritional Risk Screening (NCR, 2002), proposed more recently has proven to be an important instrument to assess nutritional risk and predict length of hospital stay of elderly patients. MNA is one of the most widely used and studied nutrition screening/assessment tools. It was developed and validated with clinical data of patients in Europe and USA in the 1990s for grading the nutritional risk of older adults in Western countries (Guigoz *et al.*, 1994, 2002; Vellas *et al.,* 2006). It has sensitivity of 96% (Christensson *et al.,* 2002) and the specificity is of 98% and the prognostic value for malnutrition is of 97% (Guigoz and Garry, 1994). Thus, MNA is considered as a very useful instrument for assessing long-term nutritional risk but not as useful for short term prognoses (Langkamp-Henken, 2006). Guigoz (2006) reported that MNA has been used in 36 studies to assess the nutritional status of 8,596 hospitalized older adults worldwide; of these, 50-80% was classified as either at risk for malnourishment or malnourished. Although the tool has been used to assess the nutritional status of Non-Caucasian elderly such as the Japanese (Kuzuya *et al.,* 2005; Izawa *et al.,* 2006), for the best results, it should be modified according to population-specific cultural and anthropometric features in order to maintain content equivalency of the tool whenever it is applied to a population different from that for which it was designed (Chumlea, 1999). MNA is a simple, low cost and non-invasive method that can be done at bedside. Added MNA scores allow one to screen the elderly who have an adequate nutritional status, those who are at risk of malnutrition and those who are malnourished. MNA consists of anthropometric and global indicators, including information on eating patterns and self-perception of health such as reduced food intake, weight loss of >3 kg body weight, mobility, bed or chair-bound, psychological stress, neuropsychological problems, body mass index, inability to live independently, taking >3 prescription drugs, having pressure sores or skin ulcers, number of full meals eaten per day, consumption of high-protein foods, consumption

of fruits and vegetables, amount of liquids consumed per day, inability to feed self, difficulty in self feeding, self-view of nutritional status, self-view of health status, mid-arm circumference <21 cm and calf circumference of <31 cm (Chumlea *et. al*., 2006). The tool has been successfully used to assess the nutritional risk of elderly who live independently, receive home care services or are institutionalized and of patients who are chronically ill, frail, have Alzheimer's disease or cognitive impairment (Guigoz, 2006; Lantigua and Porban, 2007; Bauer and Sieber, 2007). This method has been broadly used among the geriatric population (Bauer and Sieber, 2007; Hernandez *et al.,* 2007; Lantigua and Porban, 2007; Ferreira *et al.,* 2008; Tsai *et al.,* 2008) and a higher prevalence of malnutrition has been associated with the elderly most in need of care (Izawa *et al.,* 2006), though it permits early interventions without specialized nutritional team. As such, very little knowledge is available about the inter-observer reliability, though it seems to have moderate level of inter-observer reliability (Alpers *et al.,* 2009). Keeping the above facts in view, in this study, we measure inter-observer reliability on the mini-nutritional assessment tool by trained nurses.

Materials and methods

Study area: This study was conducted in the field practice area of Rural health and training Centre, Seloo, Jawaharlal Nehru Medical College and Acharya Vinoba Bhave, Rural Hospital, under Datta Meghe institute of Medical Sciences, (Deemed University) located about 17 kms away from the city of Wardha, in central India which has the population of about 1,26,116 individuals. This study was carried out during three months duration, i.e. from 1st April 2011 to 30th June 2011. Two auxiliary midwifery nurses (ANMs), posted at the rural health training centre were trained for using mini-nutritional assessment tool, which still remains a newer concept in India. One nurse did first screening after which, second nurse did the second screening with MNA, independent of first screening. MNA was translated in Marathi (local) language, which was obtained by the translation-retro translation method of the English version of MNA (Vellas *et al.*, 1999; Bleda *et al.,* 2002). Prior approval was sought from the Institutional ethics committee of JNMC for this study.

Study sample: All elderly, more than 60 years of age, residing in the field practice area of rural health training centre were selected with by stratified random sampling, in which the field practice area was divided in to five strata, being served by one primary health centre. Sample size was calculated with the help of statistical software, Epi info, version 3.5.1, with 95% confidence and 80% power and prevalence of malnutrition in elderly from pervious data was calculated to be 68, which was finalized at 80 considering non-responses. Oral informed consent was obtained from each participant prior to the participation in the study.

Parameters studied: Only the questions which primary respondent could not answer (if the patient had dementia or some other problem) were answered by primary care giver. All anthropometric measurements were taken by the nurses at the time of study. Height was measured with the help of an anthropometric rod, to the nearest of mm. The anthropometric rod, after assembling, was held in right hand and placed in back side of the individual, touching heels, buttocks, back and head. The chin was held with left hand and head was positioned such as the imaginary line drawn from tragus of the ear to the infra-orbital margin is parallel to the ground. Weight was measured with the help of portable spring balance with accuracy of 500 g. The individuals were asked to stand on the platform of the balance, without footwear and with minimal clothing. Weights were recorded to the nearest of 0.5 kg. Measurement of mid-upper arm circumference (MUAC) was done within left upper arm, with reinforced plastic tape to the nearest mm. The subject was asked to stand erect and the investigator stands on the left side. The left arm is folded at right angle at elbow, keeping close to the body. Distance from the bony prominence of the shoulder (tip of acromian process) to the tip of the elbow joint was measured. Keeping the tape in position, mid-point was marked horizontally (half of the distance measured above), then the arm was straightened and placed by the side of the body, hanging loosely. The tape was passed horizontally round the arm at midpoint such that it closely covers the arm, without applying much pressure or keeping it loose. Calf circumference was measured in erect posture, at the site of maximum calf circumference the tape was passed horizontally round the calf and circumference was measured.

MNA scale: The MNA score was calculated as the sum of the points assigned to the responses of the 18 items. According to the obtained scores, patients were classified into three categories: well nourished (MNA: 30 to 24), at risk of malnutrition (MNA: 17 to 23.5) and malnourished (MNA: less than 17), the inter-observer reliability of the MNA findings was tested using Kappa statistics for the degree of inter-observer agreement.

Results

Totally 80 participants were included in the study, of which 37 were males and 43 were females. The median time between the two screenings was 28 d which was spread over 20 to 39 d. Mean (S.D), when MNA tool was used by first nurse was 20.84 (5.40) and second sister was 21.29 (4.89). Mean (S.D) MNA scores for each heads of (Table 1) tool for first nurse and second nurse were 6.52 (1.78) and 6.43 (1.54) for anthropometric assessment, 5.06 (1.99) and 4.97 (1.98) for Global assessment, 6.75 (1.99) and 7.43 (1.63) for dietetic assessment and 2.51 (1.12) and 2.46 (1.17) for subjective assessment. None of these variations in the assessment were found to be statistically significant, except for dietary assessment ($p<0.05$).

Table 1. Mean assessment of the two independent observers.

Area	Assessment I Mean (S.D)	Assessment II Mean (S.D)	
Anthropometric assessment	6.52 (1.78)	6.43 (1.54)	
Global assessment	5.06 (1.99)	4.97 (1.98)	(p=0.003)
Dietetic assessment	6.75 (1.99)	7.43 (1.63)	
Subjective assessment	2.51 (1.12)	2.46 (1.17)	

Table 2. Level of agreement.

S. No.	Area	Item	Kappa	Level of agreement
I.	Anthropometric assessment	Body mass index (BMI)	0.89	Almost perfect
		Mid-arm circumference	0.39	Fair
		Calf circumference	0.87	Almost perfect
		Weight loss	0.63	Substantial
II.	Global assessment	Independence at home	1.00	Almost perfect
		More than 3 medicines per day	0.87	Almost perfect
		Psychological stress	0.65	Substantial
		Morbidity	0.84	Almost perfect
		Neuropsychological stress	0.75	Substantial
		Pressure sore/Skin ulcers	O.94	Almost perfect
III.	Dietetic assessment	Number of meals per day	0.73	Substantial
		Proteinic score	0.68	Substantial
		Fruits or vegetables	0.48	Moderate
		Declined food intake	0.73	Substantial
		Consumption of beverages	0.37	Fair
		Mode of feeding	0.53	Moderate
IV.	Subjective assessment	Subjective nutritional evaluation	0.53	Moderate
		Subjective health evaluation	0.20	Fair
	Total	Total MNA	0.78	Substantial

The test retest reliability (Table 2) of the test was observed to be substantial agreement (kappa=0.78) and there was almost perfect agreement for six parameters, which included body mass index, calf circumference, independence at home, medicine intake (more than 3) per day, morbidities and pressure sores/skin ulcers. There was substantial agreement on seven parameters, including weight loss, psychological stress, neuropsychological stress, neuropsychological stress, number of meals per day, proteinic score and declined food intake. Moderate agreement was observed on consumption of fruits and vegetables, mode of feeling, and subjective nutritional evaluation (kappa score 0.040 to 0.06). A fair degree of agreement was observed in mid-arm circumference, consumption of beverages and subjective health evaluation. Lowest kappa was observed on subjective health evaluation (kappa=0.20), and maximum Kappa was observed in independence at home.

Discussion

In this study, we found out a high level of inter-observer reliability in the rural area, with 80 individuals as study participants, in which the assessment of the individuals was carried out by prior trained nurses, who did not had any prior experience of using MNA. Various parameters in the MNA also showed a good range of agreement. Some areas of MNA scale showed higher levels of reliability was found to be very low, (0.20) reliability, whereas in few areas as in mid-arm circumference.

The overall reliability of MNA stands out to be with substantial reliability with kappa 0.78. There was no such study carried out in the rural part on India, with the help of staff nurses. Most of the published studied are from the hospital setup, in developed countries, where in most of the assessments are carried out by the treating physicians or specialized doctor/health care providers. The findings of this study are very much comparable to the study carried out by Bleda *et al.* (2002), in a hospital setting in Spain, in which, the overall reliability of kappa for inter-observer reliability was 0.782. There was almost perfect agreement in 6 domains, in study conducted by Bleda *et al*. (2002) as compared to study conducted by Gazzotti *et al.* (1999), in which almost perfect agreement was observed in only two domains, where as substantial level and moderate level of agreement was observed in 5 domains each. Gazzotti *et al.* (1999) had no agreement in one domain, however, no such low level of agreement as per kappa statistics were found out.

Conclusion

The findings of our study indicate that the MNA tool can be used in rural setup by auxiliary nurse midwifery (ANMs) and Accredited Social Health Activist (ASHAs), if they are prior trained in assessment of the elderly and there are no significant inter-observer variations in the results. In the developing countries like India, where doctor patient ratio is high and at many places the primary health care provider is an anganwadi worker or ASHA.

Early identification of elderly individuals at risk of malnutrition is possible and they can be referred to higher health care centre for adequate evaluation and treatment. The main limitation of the study was its inability to assess intra-observer reliability.

References

1. Alpers, D.H., Stenson, W.F. and Taylor, B.E. 2009. Manual of nutritional therapeutics, 5th Ed, Lippincott Williams & Wilkins, A Wolters Kluwer business. p.23.
2. Bauer, J.M. and Sieber, C.C. 2007. Significance and diagnosis of malnutrition in the elderly. *Z. Arztl. Fortbild. Qualitatssich.* 101(9): 605-609.
3. Bleda, M.J., Bolibar, I. and Pares, R. 2002. Reliability of the mini nutritional assessment (MNA) in institutionalised elderly people. *J. Nutr. Health Aging.* 6(2): 134-137.
4. Christensson, L., Unosson, M. and Ek, A.C. 2002. Evaluation of nutritional assessment techniques in elderly people newly admitted to municipal care. *Eur. J. Clin. Nutr.* 56(9): 810-818.
5. Chumlea, W.C. 1999. The state of the Mini Nutritional Assessment? *Nutr.* 15: 159-161.
6. Chumlea, W.C. 2006. Is the MNA valid in different populations and across practice settings? *J. Nutr. Health Aging.* 10: 524-533.
7. Ferreira, L.S., Nascimento, L.F. and Marucci, M.F. 2008. Use of the mini nutritional assessment tool in elderly people from long-term institutions of southeast of Brazil. *J. Nutr. Health Aging.* 12(3): 213-217.
8. Gazzotti, C., Peponster, A., Petermans, J. and Albert, A. 1999. Interobserver agreement on MNA nutritional scale of hospitalized elderly patients. *J. Nutr. Health Aging.* 1: 23-27.
9. Guigoz, Y. 2006. The Mini Nutritional Assessment (MNA) review of the literature-What does it tell us? *J. Nutr. Health Aging.* 10(6): 466-485.
10. Guigoz, Y. and Garry, J.P. 1994. Mini nutritional assessment: A practical assessment tool for grading the nutritional state of elderly patients. *Facts Res. Gerontol.* pp.15-59.
11. Guigoz, Y., Lauque, S. and Villas, B.J. 2002. Identifying the elderly at risk for malnutrition. The Mini Nutritional Assessment. *Clin. Geriatr. Med.* 18: 737-757.
12. Guigoz, Y., Vellas, B.J. and Garry, P.J. 1994. The Mini Nutritional Assessment (MNA): A practical assessment tool for grading the nutritional state of elderly patients. In Facts and Research in Gerontology, Nutrition Supplement. pp.15-60.
13. Hernandez, A., Lantigua, M., Escudero, H., Gutierrez, R., Martinez, R., Penie, J., Porben, S. and Perez, A. 2007. Nutritional status of Cuban elders in three different geriatric scenarios: community, geriatrics service, nursery home. *Arch. Latinoam. Nutr.* 57(3): 266-272.
14. Izawa, S., Kuzuya, M. and Okada, K. 2006. The nutritional status of frail elderly with care needs according to the Mini-Nutritional Assessment. *Clin. Nutr.* 25: 962-967.
15. Izawa, S., Kuzuya, M., Okada, K., Enoki, H., Koike, T., Kanda, S. and Iguchi, A. 2006. The nutritional status of frail elderly with care needs according to the mini-nutritional assessment. *Clin. Nutr.* 25(6): 962-967.
16. Jones, J.M. 2002. The methodology of nutritional screening and assessment tools. *J. Hum. Nutr. Dietet.* 15: 59-71.
17. Kagansky, N., Berner, Y., Koren-Morag, N., Perelman, L., Knobler, H. and Levy, S. 2005. Poor nutritional habits are predictors of poor outcome in very old hospitalized patients. *Am. J. Clin. Nutr.* 82: 784-91.
18. Kuzuya, M., Kanda, S. and Koike, T. 2005. Evaluation of Mini-Nutritional Assessment for Japanese frail elderly. *Nutr.* 21: 498-503.
19. Langkamp-Henken, B. 2006. Usefulness of the MNA in the long-term and acute-care settings within the United States. *J. Nutr. Health Aging.* 10(6): 502-509.
20. Lantigua, M.C. and Porban, S. 2007. The Mini Nutritional Assessment of the elderly in the practice of a hospital geriatrics service: inception, validation and operational characteristics. *Arch. Latinoam. Nutr.* 54(3): 255-265.
21. Tsai, A.C., Ho, C.S. and Chang, M.C. 2008. Assessing the prevalence of malnutrition with the Mini Nutritional Assessment (MNA) in a nationally representative sample of elderly Taiwanese. *J. Nutr. Health Aging.* 12(4): 239-243.
22. Ulander, K., Grahn, G. and Jeepsson, B. 1993. Subjective assessment of nutritional status: Validity and reliability of a modified Detsky index in Swedish setting. *J. Clin. Nutr.* 12: 15-19.
23. Vellas, B., Guigos, Y. and Garry, P.J. 1999. The Mini Nutritional Assessment (MNA) and its use in grading the nutritional status of elderly patients. *Nutr.* 15: 116.
24. Vellas, B., Villars, H. and Abellan, G. 2006. Overview of the MNA–its history and challenge. *J. Nutr. Health Aging.* 10: 456-463.