

DETERMINANTS OF HEALTH RELATED QUALITY OF LIFE IN HOME DWELLING ELDERLY POPULATION: APPETITE AND NUTRITIONAL STATUS

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Abstract: *Objective:* The present study aimed to examine nutritional risk factors such as poor appetite, malnutrition or obesity affecting health related quality of life in elderly. *Design and participants:* This is a cross-sectional population-based study consisted of 407 elderly (142 men and 265 women) mean aged 71.7±6.54 years. *Measurements:* Questionnaire including the demographic and general characteristics, health information, nutritional habits was performed by face-to-face interviews. Daily food consumption was assessed using 24-hour dietary recall. Mini Nutrition Assessment (MNA) and Mini Nutrition Assessment-Short Form (MNA-SF) were used for assessment of nutrition status. Appetite was evaluated using the Simplified Nutritional Appetite Questionnaire (SNAQ). Health related life quality scale (Short Form Health Survey -SF36) was used for evaluation health related quality of life. *Results:* According to MNA and MNA-SF 6.1%; 4.2% of elderly people were malnutrition and 40.3%; 21.9% of them were at risk of malnutrition respectively. Accordingly, SNAQ 28.7% of elderly were risk at loss of weight. Health related quality of life scores of women were significantly lower than men. Good nutritional (MNA-SF) and good appetite (SNAQ) status, increased 1.69, 1.48 fold in the mental component summary scale scores respectively. SNAQ was the best determinant of physical component summary scale score had the greatest positive effect, good appetite status increased approximately 2.2 fold in physical scores. Polypharmacy and high BMI decreased health related quality of life in elderly. *Conclusion:* Determinants of quality of life are preventable and treatable with early and appropriate interventions in elderly.

Key words: Health related quality of life, appetite, nutritional status, elderly.

Introduction

Ageing is a global phenomenon that is both inevitable and predictable. According to demographic data the elderly population has been increasing dramatically all over the world. Especially since 2000, the elderly population has increased faster (1). Worldwide, there were 901 million people aged 60 years or over in 2015, an increase of 48 percent over the 607 million older persons globally in 2000 (2). The number of people aged 65 or older was approximately 6.5 million in Turkey, 8.5% of total population was elderly in 2017 (3). The aging process or changes related to secondary events or diseases cause rapid deterioration of body functions in the last phase of life (4). For this reason healthy aging is important for the maintaining physical, mental health and functionality. Because of that health related quality of life is emerged as the key goal for health promotion for the elderly people (5). Health related quality of life is a subjective multidimensional construct reflecting functional status, emotional and social well being, as well as general health. It is known that one of the crucial factors affecting quality of life is the nutritional status. At the same time an impaired nutritional status frequently leads to resulted in impaired functional status besides that general health. Good nutritional and psychological status can promote the quality of life in the elderly and can decrease the mortality and morbidity (6, 7).

There is a certain relationship between malnutrition risk and quality of life in older people. Along with the increase of malnutrition prevalence with aging, comorbidity and mortality

increase in the elderly (6, 8). Especially digestive problems, sense perception such as loss of taste, smell and appetite or swallowing and chewing difficulties affect eating and/or food intake and so that health related quality of life such as mobility, activities of daily living and mental health is also affected (9).

In old age, appetite is the most important risk factor associated with food and nutritional deficiencies. There are many reasons that affect the appetite mechanisms in the aging process. These include physiological changes, psychological conditions, acute and chronic diseases and number of medication (10). Adequate and balanced nutrition is one of the most important factors affecting health related quality of life in elderly. But the reduction in appetite affect nutrition intake of elderly even it cause nutritional deficiencies and weight loss by decreasing in daily energy intake. And also poor appetite is associated with poor healthcare outcomes, including increased mortality. So appetite is important for health related quality of life in elderly because promoting better appetite increase food intake and enhance healthcare outcomes in elderly (10, 11).

There are limitations about assessment of energy, nutrient intake, appetite and health related life quality of elderly in studies. Studies have indicated that relationship between malnutrition and health related quality of life (12-16) but a few studies have shown a similar relationship a loss of appetite and health related quality of life (9, 17). The aim of the present study was to examine nutritional risk factors such as poor appetite and malnutrition affecting health related quality of life in elderly.

Material and methods

Sampling and data collection

This is a cross-sectional population-based study consisted of 407 elders (mean age 71.7 ± 6.54 years). A simple randomized sampling method was used for identifying of districts in center of Ankara, the capital of Turkey. The elderly was visited in their homes and those who agreed to participate voluntarily were recruited in the study. Elders or their parents informed about the study and signed a voluntary participation form which adhered to Declaration of Helsinki protocols (World Medical Association). Participation rate of the study was 89% and 85% of the elderly were evaluated. The data were collected in face-to-face interviews and a questionnaire was applied including the demographic and general characteristics, health information, nutritional habits, health related life quality scale (The Health Survey Short Form-SF36), Mini Nutrition Assessment (MNA), Mini Nutrition Assessment-Short Form (MNA-SF) and Simplified Nutritional Appetite Questionnaire (SNAQ).

Anthropometric measurements

Anthropometric measurements, including weight, height, waist and mid upper arm circumferences were measured by well-trained investigators, using standard measurement protocols. Participants were weighed using an electronic scale to the nearest 0.1 kg. Height was measured with a stadiometer to the nearest 0.1 cm. Waist circumference was measured at the mid-point, above the iliac crest and below the lowest rib margin at minimum respiration, using a flexible tape to the nearest 0.1 cm (18). Weight and height obtained was used to calculate body mass index (BMI) that was calculated as weight (kg) divided by height squared (m^2) (19).

Dietary Intake

Daily food consumption was assessed using 24 hour dietary recall. Researchers determined amounts of all nutrients in consumed foods by using photographic atlas of food portion size and amounts (20). Dietary data from the food records were entered into a food analysis software Nutrition Information Systems (BEBIS) to calculate the total daily intake of energy and nutrients (21).

Assessment of nutrition status

The Mini Nutrition Assessment (22) consists of 18 items structured in 4 parts: anthropometric assessment, global assessment, dietary assessment and self-assessment. The maximum possible score for the MNA full form is 30 points. This questionnaire composed of 18 different questions and anthropometric measures for ranking participants in three levels (malnutrition with scores less than 17, at risk of malnutrition with 17 and 23.5 scores and normal status with 24 and 30 scores). The revised MNA-SF (23), a shortened form of the MNA, is also used for nutritional screening, in this study. The

MNA-SF comprises six questions, including BMI, declined food intake over the past 3 months as a result of a loss of appetite/digestive problems or swallowing difficulties, weight loss during last 3 months, mobility, neuropsychological problems and psychological stress or acute disease in the past 3 months. The scores from all questions are summed together, giving a minimum score of 0 and a maximum score of 14. Higher scores indicating better nutritional status at both two forms. The score is >12 points greater, the patient is said to have normal nutritional status, scores between 8 and 11 indicate the person is at risk of malnutrition, and, if the score is ≤ 7 points, the patient is said to be malnutrition.

Evaluation of appetite

Appetite was measured using the SNAQ. The SNAQ is the short, reliable and simple appetite assessment tools that predicts risk of weight loss. The SNAQ is composed of four questions. Each question presents five options for answer which are represented by the letters from A to E. These letters based on the following numerical scale: A = 1, B = 2, C = 3, D = 4 and E = 5. When summed up and total score which may range from 4 to 20. Higher scores demonstrate a better appetite. The lower scores are higher the risk for weight loss. Score ≤ 14 indicates that risk for loss of weight (24).

Assessment of the health related quality of life (SF36)

The SF-36 is a short form questionnaire with 36 items that measure eight health related quality of life scales. They are physical functioning (PF), role limitation due to physical health (RP), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), role limitations as a result of emotional problems (RE) and general mental health (MH). For each quality of life scale tested and item scores were coded, summed, and transformed into a scale from 0 (worst) to 100 (best) using the standard SF-36 scoring algorithms. Two summary measures, physical and mental summary component scale scores were also calculated using algorithm described by the developers (25).

Statistical analysis

Statistical analysis was performed with version 16 SPSS. Health related quality of life scores (SF36) of individuals are presented as the means and they were compared according to gender using a t-test for two independent samples. Spearman's rank correlation coefficient was used to test the association between quality of life scales and markers of nutritional status and appetite. Finally, multiple linear regression analysis was carried out to identify variables that made an important contribution to the variability of quality of life and to explore the contribution of age, number of medicine used, MNA, SNAQ scores to physical and mental component summary scale scores.

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Table 1
Evaluation of health related quality of life (SF-36) scores of individuals according to gender

SF-36 Scales	Gender				MNA-SF		MNA		SNAQ	
	Men (n:142)	Women (n:265)	Normal (n:301)	At risk (n:89)	Malnourished (n:17)	Normal (n:218)	At risk n:164	Malnourished (n:25)	Normal (n:290)	Risk At Loss Of Weight (n:117)
Physical subscales	x±SD	x±SD	x±SD	x±SD	x±SD	x±SD	x±SD	x±SD	x±SD	x±SD
Physical functioning (FF)	56.4±31.37 ^a	44.6±26.98 ^b	53.7±27.62 ^a	36.5±26.24 ^b	25.0±25.31 ^b	58.0±26.78 ^a	40.8±26.25 ^b	20.20±22.98 ^c	55.1±27.68 ^a	32.8±24.00 ^b
Role-physical (FRG)	25.4±22.91 ^a	21.3±21.50 ^a	6.6±10.93 ^a	12.3±19.26 ^b	26.7±21.93 ^b	28.1±21.85 ^a	17.9±21.41 ^b	6.5±10.28 ^c	25.9±22.37 ^a	14.7±19.11 ^b
Bodily pain (BP)	69.7±24.05 ^a	59.2±22.76 ^b	66.5±22.51 ^a	54.4±23.87 ^b	42.9±24.04 ^b	68.18±22.75 ^a	58.6±22.19 ^b	44.5±27.69 ^c	66.0±23.13 ^a	55.2±23.50 ^b
General health (GSA)	55.6±19.47 ^a	48.6±18.60 ^b	53.8±18.51 ^a	45.3±18.26 ^b	32.0±19.04 ^c	56.9±18.45 ^a	46.6±17.24 ^b	29.2±13.20 ^c	55.6±18.49 ^a	39.7±15.96 ^b
Mental subscales										
Vitality (ENERGY)	57.9±18.54 ^a	52.7±17.78 ^b	57.0±17.30 ^a	47.5±18.46 ^b	45.2±20.65 ^b	59.4±16.31 ^a	49.9±18.50 ^b	40.6±17.27 ^c	57.7±18.07 ^a	46.4±15.90 ^b
Social functioning (SI)	69.8±24.74 ^a	65.0±23.06 ^a	71.0±23.08 ^a	56.3±20.39 ^b	44.1±23.01 ^b	74.0±22.28 ^a	60.1±22.17 ^b	46.0±21.86 ^c	70.4±23.38 ^a	57.4±22.14 ^b
Role-emotional (ERG)	32.6±22.18 ^a	27.3±22.68 ^b	33.6±21.27 ^a	17.6±22.38 ^b	10.7±16.60 ^b	34.9±20.89 ^a	23.4±22.89 ^b	16.0±21.23 ^b	32.1±22.08 ^a	21.7±22.36 ^b
Mental health (RS)	62.1±14.86 ^a	61.9±15.01 ^a	64.1±13.81 ^a	55.5±16.72 ^b	56.0±14.07 ^b	65.3±13.56 ^a	58.7±15.02 ^b	53.76±18.44 ^b	63.8±14.67 ^a	57.2±14.61 ^b
Physical component summary scale	51.8±19.74 ^a	43.4±16.22 ^b	50.1±17.24 ^a	37.1±14.72 ^b	26.6±16.05 ^b	52.8±17.51 ^a	41.0±14.74 ^b	25.1±12.62 ^c	50.6±17.56 ^a	35.6±14.03 ^b
Mental component summary scale	55.6±16.03 ^a	51.7±15.08 ^b	56.4±14.38 ^a	44.2±14.70 ^b	39.0±13.23 ^b	58.4±14.07 ^a	48.0±14.43 ^b	39.0±15.08 ^c	56.0±15.30 ^a	45.7±13.50 ^b

t-test, a,b,c different letters for groups p<0.05, same letters for groups p>0.05

Results

A total of 407 home dwelling elderly individuals were interviewed (142 men and 265 women) with a mean age of men and women 72.8±6.67 years; 71.1±6.41 years respectively (p<0.05). When we evaluated general and health information of elderly we found that education level of men were (6.7±4.16 years) higher than women (3.9±3.47) (p<0.05). Number of medication used and body mass index of individuals were similar both gender (men:3.3±2.67 number/day; women: 3.4±2.39 number/day, men: 27.5±4.28 kg/m2; women: 29.8±5.78 kg/m2 respectively) (p>0.05).

According to MNA and MNA-SF 6.1%; 4.2% of elderly people had malnutrition and about 40.3%; 21.9% of them were at risk of malnutrition respectively. Men generally showed more risk of malnutrition than women did, although the differences were not significant (χ^2 :5.667; p=0.059; (χ^2 :3.152; p=0.257 respectively). Accordingly, SNAQ tests 28.7% of elderly people were risk at loss of weight. Women had high level of malnutrition than men and these results was significant (χ^2 :7.378; p=0.007) (data not shown).

Health related quality of life scores of women had lower scores than men in all subscales. The significant differences were found between genders in the subscales of SF-36 which are physical functioning, bodily pain, general health, vitality, role-emotional. In addition, physical component summary scales (men: 51.8±19.74; women: 43.4±16.22) and mental component summary scales (men: 55.6±16.03; women: 51.7±15.08) were found significant different between gender (p<0.05) (Table 1).

Elderly with malnutrition/malnutrition risk (MNA –SF, MNA) and good appetite (SNAQ) had lower life quality scores than well-nourished elderly in all subscales. The significant

differences were found between groups in the all subscales of SF-36 (p<0.05) (Table 1)

Significant positively correlation was found between SF36-physical and mental component summary scale scores and MNA (r:0.365, p:0.000; r:0.293, p:0.000), MNA-SF (r:0.45, p:0.000; r:453, p:0.000), SNAQ (r:0.459, p:0.000; r:0.400, p:0.000), educational level (r:0.282, p:0.000; r:0.191, p:0.001) respectively. Also weak reverse relation were found between SF36-physical and mental scale scores and number of medication (r:-0.264, p:0.000; r:-0.173, p:0.001) and age (r:-0.221, p:0.000; r:-0.187, p:0.000) respectively. There was no relationship between anthropometric measurements, number of main meal/snack and consumption of macronutrients with health related life quality of elderly (p>0,05). Energy (r: 0.200, p:0.000; r:0.152, p:0.000 respectively) and fiber intake (r: 0.161, p:0.001; r:0.201, p:0.000 respectively) were positively correlated with both physical and mental subscale scores of life quality (p<0.05). BMI were negatively correlated with physical component summary scale scores (r:-0.103 p:0.038) (Table 2).

Table 3 identifies the results of the multiple linear regression model, where five determinants significantly associated with physical component summary scale scores of elderlies. While the combination of three determinants factors (educational level, MNA-SF and SNAQ scores) had positive effects but the others (number of medication and high BMI) had negative effects on their physical component summary scale scores. Physical component summary scale scores increased linearly as educational level, MNA-SF and SNAQ scores increased (p< 0.05) and physical component summary scale scores decreased linearly as BMI and number of medication used increased (p< 0.05). SNAQ which was the best determinant of physical component summary scale score had the greatest positive effect and good appetite status increased 2.208 fold in physical scores.

Table 2

Correlation between general information, anthropometric measurements, consumption of nutrients, nutrition status with life quality of individuals

	SF-36-Physical component summary scale		SF-36-Mental component summary scale	
	r	p	r	p
Education level (year)	0.282	0.000**	0.191	0.001**
Number of medication (number/day)	-0.264	0.000**	-0.173	0.001**
Number of main meal (time/day)	-0.089	0.071	0.060	0.224
Number of snack (time/day)	-0.047	0.362	-0.008	0.881
Age (year)	-0.221	0.000**	-0.187	0.000**
Weight (kg)	-0.034	0.489	-0.040	0.417
BMI (kg/m ²)	-0.103	0.038*	-0.037	0.452
Waist circumference (cm)	-0.063	0.219	-0.003	0.958
Mid upper arm circumference (cm)	0.008	0.881	0.027	0.601
Energy (kcal/day)	0.200	0.000**	0.161	0.001**
Protein (% energy)	0.094	0.059	0.058	0.243
Carbohydrate (% energy)	0.012	0.814	0.011	0.833
Fat (% energy)	-0.054	0.282	-0.039	0.437
Fiber (g/day)	0.152	0.002**	0.201	0.000**
MNA	0.365	0.000**	0.293	0.000**
MNA-SF	0.451	0.000**	0.453	0.000**
SNAQ	0.459	0.000**	0.400	0.000**

Spearman's rank correlation *p<0.05, **p<0.01

Table 3

Effects of some properties on physical component summary scale scores of elderly

	B	β	SE	t	p
Constant	-0.889		6.550	-0.136	0.892
Education level (year)	0.784	0.175	0.212	3.697	0.000
Number of medication (number/day)	-1.940	-0.252	0.360	-5.384	0.000
BMI	-0.365	-0.109	0.162	-2.255	0.025
MNA-SF	1.878	0.310	0.321	5.856	0.000
SNAQ	2.208	0.316	0.370	5.976	0.000

Multiple linear regression analysis R² = 0.42 (p < 0.001) Coefficient of regression, SE: Standart error of mean

In addition to number of medication had the greatest negative effect on physical component summary scale scores and it decreased 1.940 fold in physical scores.

Number of medication, MNA-SF and SNAQ scores were important determinants for mental component summary scale scores of elders. While the combination of MNA-SF and SNAQ scores had positive effects but number of medication had negative effects on their mental component summary scale scores (p<0.05). Good nutritional (MNA-SF) and good appetite (SNAQ) status, increased 1.687, 1.477 fold in the

mental component summary scale scores in elderly population respectively. Increased number of medication was negative determinant of the mental status (Table 4).

Discussion

Evaluation of factors associated with the aging process and early diagnosis and preventing of malnutrition are important to avoiding a deterioration of quality of life in elderly (26). Malnutrition is associated with functional and cognitive

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Table 4
 Effects of some properties on mental component summary scale scores of elderly

	B	β	SE	t	p
Constant	10.316		4.786	2.156	0.032
Number of medication(number/day)	-0.865	-0.140	0.283	-3.051	0.002
MNA-SF	1.687	0.324	0.264	6.397	0.000
SNAQ	1.477	0.242	0.308	4.794	0.000

Multiple linear regression analysis R2 = 0.26 (p < 0.05) β: Coefficient of regression, SE: Standart error of mean

impairment in older people and also it causes greater morbidity and reduced quality of life (27). Quality of life includes health status and life expectancy and depends on physical and psychological well-being and these factors can be influenced by nutritional status. So the nutritional status of elderly plays an important role in protecting health, improving quality of life (6, 8, 16).

Many studies have limitations impact of energy and nutrient intake and appetite on quality of life (14, 28, 29). Especially association between MNA with anthropometric measurements and quality of life in older people has been studied previously (8, 14, 28, 29) but relationship between quality of life with energy and nutrient intake and appetite are lacking. The present study investigated the relationship between quality of life with nutritional status and appetite in a group of home dwelling older people.

In general, poor quality of life was common in women and being female was best determinant for physical, and mental health with malnutrition/risk of malnutrition (30-32) Studies reported that women had lower scores on all subscales of the SF-36 than men in many studies (12, 31-33). These results were in accordance with the present study that women have a substantially worse health related quality of life scores on both the physical and mental scales of the SF36 (men: 51.8±19.74, women: 43.4±16.22; men:55.6±16.03, women: 51.7±15.08 respectively) (p<0.05). And especially role-physical and role-emotional subscales scores were very low in both gender (p<0.05). (Table 1).

Sociodemographic and lifestyle-related factors such as educational level, less physical activity, sleep duration, increased number of medication and aging affect life quality of life in elderly (31). Studies have determined that lower educational level and advanced age associated with an increasing deterioration of health status and quality of life (34-36). Therefore, the quality of life is very important determinant for improving quality of aging. Consistent with the previous studies it was found that quality of life was worse in older ages with a lower education level. In the present study, SF-36-physical and mental component summary scale scores were found negatively correlate with number of medicine. Similar to our result, Harrison and et. al. reported that increased number of medications were associated with lower quality of life scores in elderly (37).

Losing sense of smell and taste, decreasing ability to chew and swallow, impaired gastrointestinal function, comorbidities and polypharmacy leads to poor nutrition and increases the risk of malnutrition in elderly (38-40). It was known that malnutrition was common in elderly. Malnutrition prevalence was found according to MNA 6.1% and MNA-SF 4.2% and risk of malnutrition were 40.3%; 21.9% respectively in present study. Malnutrition is associated with physical, mental, and social disability so malnutrition usually causes greater morbidity and reduced quality of life (41). Common problems individuals with malnutrition were losing muscle mass and functional impairment which decreased health related quality of life (40, 42, 43). Impaired nutritional status can accelerate functional and mental problems in elderly. In this study, elderly with malnutrition/malnutrition risk (MNA-SF, MNA) had lower life quality scores in all subscales (p<0.05). (Table 1). MNA and MNA-SF scores of elderly significantly positive correlated with mental and physical component scores of SF-36 (Table 2). Elderly nutritional status is important determinant for mental and physical health.

Poor appetite was also an important risk factor affected the quality of life. Physiological changes, psychological problems, acute and chronic diseases and polypharmacy impair appetite with different mechanisms in elderly (10). According to appetite status (SNAQ) of elderly with 'risk of loss of weight' had lower health related quality of life scores in all subscales (p<0.05) (Table 1). On the other hand, elderly with good appetite had increased SF-36-physical and mental component summary scale scores in this study. Better appetite also promotes adequate and balanced nutrition and increases dietary energy intake. It was found that dietary energy intake was positively correlated health related quality of life in present study (p<0.05), (Table 2).

MNA-SF scores had the greatest positive effect in the mental and physical component summary scale scores. (Table 3-4) So that it is considering that nutritional status may be an important influence on quality of life in elderly. In another study reported that a strong relationship between malnutrition risk and poorer quality of life in elderly (12). Good nutrition improves quality of life in older people by promoting health and preventing dietary deficiency disease. (12, 40). Therefore, it is important to assess nutritional status when evaluating health related quality of life in older people.

Other nutritional indicators that may affect quality of life were also assessed in this study. It was not found any significant association between number of main meal/snack and dietary energy and nutrient intake (except dietary fiber intake) with life quality. A study (44) reported that a greater adherence to the Mediterranean diet was associated with better quality of life in elderly. Especially the health protective properties of Mediterranean diet become significant with the intake of fibre. Another finding of the current study suggests that dietary fibre intake was positive correlated health related quality of life of elderly in our study ($p < 0.05$) (Table 2). Fruits and vegetables consumptions increase dietary fibre intake which is one of the most important components of the Mediterranean diet. So Mediterranean diet should promote due to their benefits on other health outcomes. However there is limited data about effects of specific food components of the Mediterranean diet on quality of life in older people (45).

Physical changes include in body composition that occur with aging have potential adverse impacts in health related quality of life in older people (12) but there isn't any significant association between anthropometric measurements (except BMI) with health related life quality of elderly in present study. High BMI values had a significant impact on the all cause of mortality and morbidity (46-48) and studies indicated that the most appropriate BMI range for the elderly was 25-27 kg/m² for prevention morbidity Mean BMI of elderly were higher than 27 kg/m² in both gender and also physical quality of life scores negatively correlated with BMI in present study (Table 2). It is important that normal ranges BMI for elderly in order to increase health related quality of life and functionality.

Conclusion

In this light, appetite and nutritional status may be described as two major determinants of mental and physical health for home dwelling elderly. The two determinants of quality of life are preventable and treatable with early and appropriate interventions in this group. Another determinant of quality of life was medication. Polypharmacy was negatively affected both physical and mental functioning. For this reason, rational approach to drug use should be adopted in old age. And also considerable result of this study, prevention of ≥ 27 kg/m² BMI is important in order to improve health related quality of life in elderly.

In this study, reached a large elderly group and anthropometric measurements of individuals were taken. However, body compositions were not evaluated. High BMI affects negatively quality of life which may be due to the increase in fat mass as well as the loss of muscle mass and sarcopenic obesity. It will be useful to evaluate sarcopenic obesity in future studies.

Ethical Standards: The study protocol was approved by the Ethical Committee of the Gazi University of Ankara/Turkey (2017-473) and written informed consent was obtained from all participants.

Conflicts of interest: Authors declare no conflict of interest.

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