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# RAPID GERIATRIC ASSESSMENT, PHYSICAL ACTIVITY, AND SLEEP QUALITY IN ADULTS AGED MORE THAN 65 YEARS: A PRELIMINARY STUDY

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**Abstract:** *Objective:* (1) To evaluate geriatric syndromes using the Rapid Geriatric Assessment; (2) To investigate possible association of geriatric syndomes with physical activity and sleep quality in adults aged more than 65 years who applied to outpatients physical medicine and rehabilitation clinic. *Design:* A cross-sectional study. *Setting:* Outpatient physical medicine and rehabilitation clinic in Edirne, Turkey. *Participants:* A total of 56 adults (mean aged 69.7 ± 4.0 (range, 65–80) years, 33 women). *Measurements:* The Rapid Geriatric Assessment, which includes the FRAIL Questionnaire Screening Tool for frailty, Simplified Nutritional Assessment Questionnaire (SNAQ), SARC-F Screen for Sarcopenia, and Rapid Cognitive Screen (RCS), was used to assess geriatric syndromes. The International Physical Activity Questionnaire (IPAQ) was used to obtain data regarding health-related physical activity. The Pittsburgh Sleep Quality Index (PSQI) was used to measure sleep quality during the past month. *Results:* The mean age of the patients was 69.7 ± 4.0 years. Of the 56 patients, 12.5% were frail, 50.0% were pre-frail, 35.7% had sarcopenia, 44.6% had a risk of weight loss, 33.9% had dementia, 57.1% were physically inactive, and 53.6% had poor sleep quality. The total FRAIL and SARC-F scores were positively correlated with the global PSQI score (correlation coefficient (r) = 0.300, $p < 0.05$; r = 0,327, $p < 0.05$, respectively) and negatively correlated with the total RCS score (r= -0,267, $p < 0.05$; r = -0,314, $p < 0.05$, respectively)). The total FRAIL score was positively correlated with the SARC-F score (r = 0.695, $p < 0.001$), and the concurrence of frailty and sarcopenia in the same patients was 10.7%. The global PSQI score was negatively correlated with the SNAQ score (r = -0.273, $p < 0.05$). *Conclusion:* Frailty and sarcopenia were positively correlated with poor sleep quality and negatively correlated with cognition and physical activity. In clinical practice, the Rapid Geriatric Assessment and determination of physical activity level could assist in disability prevention.

**Key words:** Aged, frailty, malnutrition, sarcopenia, syndrome.

## Introduction

The need for preventing age-associated disability is underlined by the World Health Organization as follows: "The number of people around the world aged ≥60 years is expected to rise to 1.2 billion by 2025 and 2 billion by 2050." Recently, the prevention against disability has focused on "the identification of early stages of disability-including subclinical disability" (1). Efforts for the prevention of frailty, sarcopenia, and nutritional and cognitive impairments are gaining importance because the aging process is mostly associated with geriatric syndromes. The presence of more than one geriatric syndrome in the same person leads to a higher risk of functional decline (2).

The structure of symptoms prompted the hypothesis that older persons are not aware of symptoms unless they start to experience functional decline. The European Working Group on Sarcopenia in Older People (EWGSOP) defines sarcopenia as a progressive and generalized loss of skeletal muscle mass and strength. Moreover, it is associated with a risk of important adverse outcomes, such as disability, loss in life quality, and death (3, 4). Sarcopenia is considered an important public health problem owing to its important clinical, economic, and social consequences (5). The physical phenotype of frailty includes evidence of muscle weakness, unintentional weight loss, low physical activity, slow walking speed, and exhaustion. Frailty and sarcopenia are reversible processes that result in either worsening or improvement of symptoms; nutrition and physical activity play a key role in treatment or prevention (6). Malnutrition is common in individuals aged >65 years because of chronic diseases, depression, chewing problems, physical disability, and drug use. Inadequate diet, such as that involving excessive calorie restriction, leads to muscle and bone loss in the elderly, and this is one of the major causes of undernutrition (1). Conscious weight loss in the elderly increases the levels of toxins and fatty acids in circulation, accompanied by muscle and bone loss. All of these are associated with early mortality. The elderly who had malnutrition or those at risk for malnutrition have a 45% higher risk than elderly who had normal nutrition of experiencing at least one episode of fall (7). Dementia is an important geriatric problem that causes disability and requires care for elderly individuals without any chronic disease. With geriatric assessment, disability, hospitalization, and death are delayed (8).

The aim of this study was to evaluate the frequency of the occurrence of sarcopenia, frailty, anorexia, and cognitive impairment using the Rapid Geriatric Assessment (RGA) and to investigate the possible association of the results with physical

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activity and sleep quality in patients aged ≥65 years who presented to our polyclinic.

## Methods

Patients aged ≥65 years, who presented to the outpatient clinics between January 1, 2018, and March 1, 2018, were screened for this cross-sectional study. Those with serious communication problems and serious neurological (e.g., abnormal pattern of posture or movement and history of stroke), orthopedic (e.g., injury and surgery history), rheumatic and vascular disorders that affect walking were excluded. The remaining 56 patients without any previously documented geriatric assessment were included in the study cohort. This study was approved by the Local Ethical Committee (TÜTF-BAEK 2017/340) and informed consent was obtained from all participants.

Screenings were organized by conducting face-to-face interviews. Demographic data (age, sex), residential area (urban or rural), and living status (alone, with a spouse, or with children) were recorded.

### *Rapid Geriatric Assessment*

RGA was used for screening frailty, sarcopenia, nutritional status, and cognition. The physical activity status was evaluated with the International Physical Activity Questionnaire (IPAQ). Finally, the Pittsburgh Sleep Quality Index (PSQI) was used for assessing sleep quality.

RGA was developed at Saint Louis University, and it is a preferred tool for screening main geriatric syndromes. It comprises the following four brief questionnaires: Simple FRAIL Questionnaire Screening Tool, SARC-F Screen for Sarcopenia, Simplified Nutritional Assessment Questionnaire (SNAQ), and Rapid Cognitive Screen (RCS) (9).

The Simple FRAIL Questionnaire Screening Tool consists of five questions regarding fatigue, resistance, aerobic status, illnesses, and loss of weight in the last 6 months. "Yes" answer to questions suggests pre-frail (to one or two questions) or frailty (to three or more questions) (9).

The SARC-F Screen for Sarcopenia comprises five questions regarding strength, assistance in walking, rise from a chair, climbing stairs, and falls in the last year. A total score of ≥4 indicates sarcopenia (9).

SNAQ has been validated as an identifier of weight loss risk over the next 6 months in older patients. It evaluates the perception of appetite, taste of food, portion of a meal that is enough for patients to feel full, and number of daily meals. A total score of ≤14 indicates risk of at least 5% weight loss within 6 months (9, 10).

RCS includes four questions for recognizing dementia and mild cognitive impairment. A total score of <5 indicates dementia, that of 6–7 indicates mild cognitive impairment, and that of 8–10 indicates normal cognition (11).

### *Physical Activity*

Validity and reliability tests for the long and short forms of IPAQ were performed by Craig et al. in 2003 (12). Validity and reliability tests for the Turkish version of the long and short forms of IPAQ were performed by Sağlam et al. in 2010 (13). The short form used in the study provides information on the time spent walking, moderate-intensity activity, vigorous-intensity activity, and sedentary activity. Activity levels according to IPAQ are inactive (<600 MET•min•wk–1), minimal active (601–3000 MET•min•wk$^{-1}$), and very active (>3000 MET•min•wk$^{-1}$) (12).

### *Sleep Quality*

PSQI was developed by Buysse et al. in 1989 (14). The validity and reliability tests for the Turkish version were performed by Ağargün et al. in 1996. PSQI is a reliable, valid, and standardized questionnaire that measures sleep quality over a 1-month time interval and provides clinical evaluation of various sleep disturbances that may affect sleep quality. It has seven components, namely, subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping medication, and daytime dysfunction. Each component is scored between 0 (no difficulty) and 3 (serious difficulty).

The sum of the scores of the seven components composes the total PSQI score. A high score indicates poor sleep quality. A global PSQI score of >5 indicates poor sleep quality, but a score of ≤5 indicates a good sleep quality (14).

### *Statistical Analyses*

The Statistical Package for the Social Sciences (version 20) was used to analyze data obtained through the study. Descriptive statistics were expressed as frequency, percentage, mean, standard deviation, median, and minimum–maximum. All variables were tested for normal distribution using the Kolmogorov–Smirnov test. When a normal distribution was not found, Mann–Whitney U test was used for analyzing quantitative independent data. The chi-square test was used to compare qualitative independent data. Associations between the variables and direction of the relationship were analyzed by Pearson's or Spearman's correlation. A p value of <0.05 was considered to be statistically significant.

## Results

The mean age of patients was 69.7 ± 4.0 (range, 65–80) years. Demographics, residential area, and living status of patients are shown in Table 1. The RGA, IPAQ, and PSQI scores of both groups are presented in Table 2. The walking sub-score, moderate-intensity sub-score, and total IPAQ score were significantly lower and the FRAIL, the SARC-F, sleep disturbance, and use of sleeping medications scores assessed using PSQI were significantly higher in women than in men (p <0.05) (Table 2). The prevalence rates of frailty, sarcopenia,

**Table 1**
Demographics, residential area, and living status of patients

| | Women (n:33) | Men (n:23) | p | Total (n:56) |
|---|---|---|---|---|
| Age (years) Mean ±SD | 70.0±4.1 | 69.4±4.0 | 0.561 | 69.7 ± 4.0 |
| (Min-Max) Median | (65-80) 69 | (65-80) 68.5 | | (65-80) 69 |
| Urban area N (% within gender) | 24 (72.7) | 16 (69.6) | 0.797 | 40 (71.4) |
| Rural area N (% within gender) | 9 (27.3) | 7 (30.4) | | 16 (28.6) |
| Living alone | 4 (12.1) | 3 (13.0) | | 7 (12.5) |
| Living with a spouse | 15 (45.5) | 16 (69.6) | | 31 (55.4) |
| Living with children | 14 (42.4) | 4 (17.4) | | 18 (32.1) |

Pearson Chi-Square

**Table 2**
The Rapid Geriatric Assessment, International Physical Activity Questionnaire and Pittsburgh Sleep Quality Index Scores

| | Women (n:33) | Men (n:23) | p value | Total (n:56) |
|---|---|---|---|---|
| *Rapid Geriatric Assessment Scores* | | | | |
| | | *(Min-Max) Median* | | |
| FRAIL score | (0-4) 1 | (0-5) 0 | <0.002* | (0-5) 1 |
| SNAQ score | (11-19) 15 | (9-20) 15 | 0.686 | (9-20) 15 |
| SARC-F score | (0-9) 4 | (0-4) 1 | <0.001* | (0-10) 2 |
| RCS score | (0-10) 7 | (4-10) 7 | 0.774 | (0-10) 7 |
| *The International Physical Activity Questionnaire Scores* | | | | |
| | | *Mean±SD* | | |
| Walking (min/week) | 564.5±1282.0 | 885.3±1073.0 | 0.034* | 696.3±1200.9 |
| Moderate-Intensity (min/week) | 49.1±226.2 | 177.4±399.1 | 0.039* | 101.8±312.3 |
| Vigorous-Intensity (min/week) | 0.0±0.0 | 146.1±700.6 | 0.213 | 60.0±449.0 |
| Total Physical Activity (MET-min/week) | 613.6±1345.0 | 1208.7±1574.3 | 0.016* | 858±1459.9 |
| *The Pittsburgh Sleep Quality Index Scores* | | | | |
| | | *(Min-Max) Median* | | |
| Sleep quality | (0-3) 1 | (0-3) 1 | 0.611 | (0-3) 1 |
| Sleep latency | (0-3) 2 | (0-3) 2 | 0.284 | (0-3) 2 |
| Sleep duration | (0-3) 0 | (0-3) 1 | 0.519 | (0-3) 1 |
| Habitual sleep efficiency | (0-3) 0 | (0-2) 0 | 0.904 | (0-3) 0 |
| Sleep disturbance | (1-3) 2 | (1-2) 1 | 0.006* | (1-3) 2 |
| Use of sleeping medication | (0-3) 0 | (0-0) 0 | 0.032* | (0-3) 0 |
| Daytime dysfunction | (0-3) 0 | (0-3) 0 | 0.640 | (0-3) 0 |
| Global PSQI score | (2-16) 7 | (3-11) 6 | 0.313 | (2-16) 6 |

Independent samples Mann-Whitney U test, * p<0.05 was considered statistically significant. IPAQ score (MET•min•wk-1)

weight loss, and dementia measured using RGA were 12.5%, 35.7%, 44.6%, and 33.9%, respectively, in patients aged ≥65 years. The prevalence of pre-frail and sarcopenia was significantly higher in women than in men ($p < 0.001$) (Table 3). The prevalence rate of more than one geriatric syndrome in the same person was 39.4% (n = 22) with a median of one syndrome per person (minimum 0 to maximum 4). Although the prevalence rate of having four syndromes in the same person was 3.6% (n = 2), 5.4% (n = 3) had three syndrome, 30.4% (n = 17) had no geriatric syndrome, 30.4% (n = 17) had one syndrome, and 30.4% (n = 17) had two syndromes. Of the patients, 10.7% (n = 6) had both frailty and sarcopenia. While 85.7% of frailty patients also had sarcopenia, 30.0% of patients with sarcopenia also had frailty. Additionally, 50.0% of pre-

**Table 3**
The frequency of geriatric syndromes, physical inactivity, and poor sleep quality

| | Women (n:33) | Men (n:23) | p | Total (n:56) |
|---|---|---|---|---|
| | N (% within gender) | | | N (%) |
| Frail | 4 (12.1) | 3 (13.1) | <0.001* | 7 (12.5) |
| Pre-frail | 23 (69.7) | 5 (21.7) | | 28 (50.0) |
| Nonfrail | 6 (18.2) | 15 (65.2) | | 21 (37.5) |
| Sarcopenic | 18 (54.4) | 2 (8.7) | <0.001* | 20 (35.7) |
| Not sarcopenic | 15 (45.5) | 21 (91.3) | | 36 (64.3) |
| Risk of weight loss | 15 (45.5) | 10 (43.5) | 0.888 | 25 (44.6) |
| Not risk of weight loss | 18 (54.5) | 13 (56.5) | | 31 (55.4) |
| Dementia | 11 (33.3) | 8 (34.8) | 0.989 | 19 (33.9) |
| Mild Cognitive Impairment | 7 (21.2) | 5 (21.7) | | 12 (21.4) |
| Normal | 15 (45.5) | 10 (43.5) | | 25 (44.6) |
| Inactive | 24 (72.7) | 8 (34.8) | 0.018* | 32 (57.1) |
| Minimal active | 8 (24.2) | 13 (56.5) | | 21 (37.5) |
| Very active | 1 (3.0) | 2 (8.7) | | 3 (5.4) |
| Good sleep quality | 15 (45.5) | 11 (47.8) | 0.861 | 26 (46.4) |
| Poor sleep quality | 18 (54.5) | 12 (52.2) | | 30 (53.6) |

Pearson Chi-Square, p<0.05* was considered statistically significant.

frail patients also had sarcopenia, and 35.7% of patients with sarcopenia were pre-frail at the same time.

The prevalence of inactivity was significantly higher in women than in men ($p < 0.05$). There was no statistically meaningful difference in the prevalence of sleep quality between sexes (Table 3). Correlations of parameters with statistical significance are presented in Table 4.

## Discussion

This study contributes to existing literature because it obtained data on the prevalence of main geriatric syndromes such as frailty, sarcopenia, weight loss, and cognitive impairment in patients aged ≥65 years who presented to our polyclinic. Moreover, it put forward an opportunity to discuss the association between physical activity and sleep quality. Geriatric syndromes identified with RGA according to their order of frequency were weight loss, sarcopenia, dementia, and frailty. However, 50% of all patients were pre-frail, and it was the most prevalent problem. Patients aged ≥65 years living in urban areas were more prone to sarcopenia than those living in rural areas and those living alone were more prone to weight loss and physical inactivity than those living with relatives. Our results support that older people living alone are more prone to physical, mental, and emotional problems than those living with relatives (15). Therefore, specific health approaches are necessary for those who live alone and those who living in urban areas.

The prevalence rates of sarcopenia vary between 5% and 13% in individuals aged 60–70 years and between 11% and 50% in those aged >80 years because of differences in the measurement methods used to identify sarcopenia, which is twice as common as frailty. In the present study, the prevalence of sarcopenia was found to be quite similar to that reported in a recent study from a single-center experience in Turkey between 2013 and 2017; the frequency of sarcopenia reported in this study was 31.7% (16). We used SARC-F for defining sarcopenia in accordance with the recent literature, wherein SARC-F has low sensitivity but high specificity in all sarcopenia definitions (EWGSOP, Foundation for the National Institutes of Health, International Working Group on Sarcopenia, and Sarcopenia with limited mobility). They reported 25% sensitivity and 81.4% specificity of SARC-F against the EWGSOP definitions of sarcopenia (17).

The prevalence rates of frailty (12.5%) and sarcopenia (35.7%) in our population were in line with those reported in a recent study; the estimated frequencies of frailty (using Fried's physical frailty scale) and sarcopenia (according to the EWGSOP criteria) in individuals aged 60–80 years were 6%–35% and 7%–35%, respectively (16, 18). In our study, a positive correlation was found between the FRAIL and total SARC-F scores, and concurrence of frailty and sarcopenia in the same patients was 10.7%. Although the reported rate of frail patients with sarcopenia was 53% (16), we found a similar rate for pre-frail patients and lower rate for frail patients. These findings support the view that even though most fragile elderly have concurrent sarcopenia, only some elderly with sarcopenia

have frailty at the same time (19).

**Table 4**
Correlations of parameters with statistically significance

| | | r | p |
|---|---|---|---|
| Residential area | Total SARC-F score | 0.281 | 0.036 |
| Living status | SNAQ score | -0.344 | 0.010 |
| | IPAQ Total Physical Activity Score | 0.314 | 0.018 |
| Total FRAIL score | Total SARC-F score | 0.695 | 0.000 |
| | Total RCS score | -0.267 | 0.047 |
| | Global PSQI score | 0.300 | 0.024 |
| Total SNAQ score | Global PSQI score | -0.273 | 0.042 |
| Total SARC-F score | Total RCS score | -0.314 | 0.019 |
| | Global PSQI score | 0.327 | 0.014 |
| IPAQ walking | Total SARC-F score | -0.350 | 0.008 |
| IPAQ moderate-intensity | Total RCS score | 0.284 | 0.034 |
| IPAQ total physical activity score | Total SARC-F score | -0.389 | 0.003 |

Spearman rho, $p<0.05$ was considered statistically significant.

The prevalence rates of pre-frail and frail older individuals were comparable with those found via a cross-sectional national survey from Israel that reported 57.4% and 4.9% for pre-frail and frail older individuals, respectively (20). The result that frail older individuals were more likely to be women in this study is parallel to that of previous literature (20, 21).

The rates of having more than one syndrome in the same older individual in our study (30.4%, 30.4%, 30.4%, and 3.6% rates of having none, one, two, and more than four syndromes, respectively) fairly differed from those in a study that reported 12%, 22.9%, 21%, and 27.1%, respectively (16). Mueller et al. (22) reported a median number of three syndromes per participants, and vision impairment, hearing loss, and osteoporosis as the prevalent geriatric syndromes of the study in which frailty or sarcopenia was not evaluated.

Inadequate nutritional intake, particularly of proteins, can lead to physiological decline in the mass and muscle function and progression of sarcopenia and frailty (1). The risk of weight loss in our study was much higher than the reported frequency of malnutrition (9.6%) and has almost the same malnutrition risk (31%) (16, 23).

The prevalence rate of dementia in this study was found to be higher than that reported by Bulut et al. (21.6%). They reported dominance of dementia in men, whereas we did not find a difference between sexes (16). In the present study, the prevalence rate of mild cognitive impairment was consistent with that of 18.9%–22.4% in people aged >60 years in a previous study (24).

In this study, the elderly's physical activity levels measured by IPAQ were found to be consistent with those of the spry elderly aged ≥65 who are living in nursing homes, as reported in the literature (25). In a previous study, the reported inactive, minimally active, and very active physical activity levels of the elderly were 47.2%, 43.7%, and 9.1%, respectively (25). Moreover, the study reported that the total physical activity duration and global PSQI score have a negative correlation, that is, more physical activity results in a better sleep quality. We did not find a relationship between the two parameters, possibly because of the small sample size in our preliminary study. Instead, we found a positive correlation among the total FRAIL, SARC-F, and the global PSQI scores. Moreover, we found a negative correlation between the global PSQI score and the SNAQ score, which indicates that the elderly with poor sleep quality have a higher risk of weight loss, frailty, and sarcopenia. Even in the literature, physical activity was described as a remedy for physical frailty and sarcopenia (26). Consistent with the literature, our study showed that physical activity and sarcopenia have a negative correlation. Furthermore, physical inactivity as a lifestyle is the main cause of muscle weakness; this, in turn, facilitates a sedentary behavior and loss of muscle mass and strength (1) The result that physical activity durations of walking, moderate-intensity activity, and total activity are significantly higher in men than in women in this study is parallel to that of previous literature (25).

The rate of poor sleep quality in our study (53.6%) was lower than that reported in the elderly living in nursing homes (83.3%) (25). Low sleep quality had an adverse effect on the quality of life of a Turkish elderly (27). Additionally, patients aged >65 years with sleep problems have lower mental health scores (28). As a contribution to the literature, in our study, we found a negative but weak relationship between total RCS and FRAIL and SARC-F scores. Clinically, our findings indicate that higher the cognitive ability, lower the frailty and sarcopenia.

Nevertheless, this study has some limitations. First, the sample size is small; future studies with larger samples would help confirm our findings. Second, we did not use direct physical measurements which would be more valid, but also be more expensive and less available. Third, this study was conducted using convenience sampling of the elderly who presented to the physical medicine and rehabilitation outpatient clinic and thus, it may not be a representative of the entire elderly population. Fourth, the cross-sectional design did not allow for the resolution of the possible causes in relation to time. However, our preliminary results put forward some intriguing data concerning RGA, physical activity, and sleep quality.

In conclusion, frailty and sarcopenia are positively correlated with poor sleep quality but negatively correlated with cognition. In clinical practice, it will be useful to consider geriatric syndromes while evaluating older adults. RGA and the determination of physical activity level could assist in the prevention of disability related to frailty, sarcopenia, anorexia, dementia, and poor sleep quality by improving the early detection of geriatric syndromes in the elderly.

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*Ethics approval and consent to participate:* This study was approved by the Local Ethical Committee (TÜTF-BAEK 2017/340) and informed consent was obtained from all participants.

*Competing interests:* All authors declare that they have no competing interests.

*Authors' contributions:* All authors have read and approved the final manuscript. Study concept and design: FT, AÜ, HBC, HT. Data collection: FT, HBC. Analysis and interpretation of data: FT, AÜ, HT. Drafting of the manuscript: FT, AÜ, HT. Revision of the manuscript: FT, AÜ, HBC, HT. The authors have full control of all the primary data and are willing to allow the journal to review their data if needed.

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