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Association of pain and frailty in older adults with Gonarthrosis referred to a university hospital in Türkiye

Azize Aydemir [1], Dilek Yidirim Gürkan [2*], Murat Korkmaz [3], Muhammed Sarikaya [3]

1. Faculty of Health Sciences, Department of Midwifery Giresun University, Turkey
2. Faculty of Health Sciences, Department of Public Health Nursing, Yozgat Bozok University, Turkey
3. Medical School, Deparment of Orthopedics and Traumatology, Yozgat Bozok University, Turkey

* Correspondence: Dilek Yidirim Gürkan. Faculty of Health Sciences, Department of Public Health Nursing, Yozgat Bozok University, Turkey.
Tel: +905077455844; Email: dilek.yildirim@yobu.edu.tr

Abstract

Background: Gonarthrosis (GA) is a chronic degenerative disease. This study aimed to determine the frailty level of patients with GA aged 65 and over and to investigate the effect of pain on frailty.

Methods: The population of this cross-sectional study consisted of patients and their relatives who applied to the orthopedics and traumatology outpatient clinic of a university hospital for examination, follow-up and treatment from October 1, 2021, to January 31, 2022. The study was completed with 160 elderly people aged 65 years and over. Data were collected using Personal Information Form, Tilburg Frailty Indicator (TFI), Get Up and Go Test (GGT), and Geriatric Pain Scale (GPS). Simple descriptive statistics, as well as correlation and multiple linear regression analysis, were used to analyze the data using SSPS 20. The significance level was set at $p < 0.05$.

Results: In this study, 45.6% of the participants were found to have moderate pain (52.42±12.40), 70% were frail (7.58±2.13), and 36.9% had a fall risk (17.15±7.57). The mean TFI (7.48±2.38), GGT (12.01±6.16), and GPS (71.37±14.20) scores of the participants with GA were significantly higher than those without GA. The frailty scores of the participants with severe pain and a high risk of falling were significantly higher ($p < 0.05$). Moreover, the pain severity of the participants accounted for 47.7% of the frailty level. According to our regression model, the variable affecting the severity of major pain was GA stage IV (p=0.000), which increased pain by 3.260 (2.456-3.944) times.

Conclusion: The study provides ample evidence supporting the potential importance of pain severity assessment and pain management to prevent frailty in patients with GA aged 65 and over.

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Highlights

What is current knowledge?

Gonarthrosis is not only a physical disorder but also an important factor that increases frailty in elderly individuals. Therefore, pain management and controlling disease progression in this disease are of vital importance for the prevention and improvement of frailty.

What is new here?

The study reveals that gonarthrosis not only affects joint health but also worsens the general frailty status in elderly individuals. In particular, the finding that GA stage IV increases pain intensity by 3.260 times and that this situation explains 47.7% of the frailty level provides a new contribution to the existing knowledge in the literature. These findings emphasize that controlling the progression of gonarthrosis and pain management are of critical importance in reducing the risk of frailty in elderly individuals and indicate that clinical approaches in this area should be reconsidered.

Introduction

Osteoarthritis (OA) is a chronic disease, the incidence of which increases with age (1). One of the large joints most commonly affected by OA is the knee (KOA) (1-4). With the gradual increase in life expectancy and aging population, KOA not only affects the quality of life of patients but also poses a burden on global public health (4). The presence of OA in the knee is defined as gonarthrosis (GA). Studies show that approximately 37% of the population over the age of 60 in the US has been diagnosed with GA (2,3). While the incidence of gonarthrosis increases with age, it is seen at a rate of 53% in women and 33% in men over the age of 80 (5).

Gonarthrosis (GA) is a chronic degenerative disease characterized by erosion of the articular cartilage, subchondral sclerosis, osteophyte formation, and biochemical and morphological changes in the synovial membrane and joint capsule. It has been reported that the history of pain, physical inactivity, the tendency to fall (6), and the risk of disability (7) increase in individuals with radiological progression of the disease. In addition, pain due to acute and chronic inflammatory processes is the most common clinical symptom in these patients (1,8). Pain creates losses in physiological reserves, which leads to impaired mobility, and it is assumed that this affects the level of frailty, especially in older adults (8,9).

Age-related frailty is a condition characterized by increased sensitivity and decreased responsiveness to stress factors. This is a multidimensional process that can lead to negative health outcomes and even death (8,10). There is no single scale generally accepted in clinical practice to diagnose frailty. It is generally associated with many factors, such as weight loss, exhaustion, low activity, slowness and weakness of the elderly (11). In addition, various longitudinal studies have shown that OA and frailty have common risk factors and lead to similar results (7,12,13). However, when the literature is examined, it is seen that there are very few studies investigating the effect of pain on frailty (1,14). This study aimed to investigate the frailty of GA patients aged 65 years and over and the effect of pain on frailty. Defining the relationship between pain and frailty in GA patients means early intervention to pain, which can increase the quality of life in older adults and help prevent many adverse conditions that may develop due to frailty. This study aimed to determine the frailty level of patients with GA aged 65 and over and to investigate the effect of pain on frailty.

Methods

This cross-sectional study was completed with 160 participants aged 65 years and older. The target population of the study consisted of patients and their relatives who were admitted to the orthopedics and traumatology outpatient clinic of a university hospital for examination, follow-up and treatment from 1 October 2021 to 31 January 2022. Purposive sampling method was used in the study. Elderly participants who met the inclusion and exclusion criteria of the study were included. Inclusion criteria: Being 65 years of age or older, not having a diagnosis of GA (For those to be included in the control group), having a diagnosis of stages III and IV GA according to the Kellgren-Lawrence classification criteria, and having the mental ability to understand and answer the questions asked. Exclusion criteria: Undergoing cancer treatment, having disabilities, such as limb amputation, stroke-related sequelae and inability to speak, undergoing surgery for an orthopedic problem in the last six months, and having an organic psycho-emotional disorder and/or a neurological degenerative disease.

The participants were divided into three groups by orthopedics and traumatology specialists: Group 1 consisted of 50 patients diagnosed with grade III GA, Group 2 consisted of 50 patients diagnosed with grade IV GA, and Group 3 (Control group) was composed of 60 individuals without GA. The GA stage of the participants was determined using the Kellgren-Lawrence Gonarthrosis classification criterion. The researchers administered the scales to older adults who were referred by orthopedists from the beginning of the outpatient clinic examination to the end of the working day (09:00-17:00). Prior to the administration of the tools, the participants were informed of the purpose of the research and their verbal and written informed consent was obtained. The researchers read the items in the scales to the participants and the scales were filled in based on the responses of the participants. It took about 35-40 minutes for each participant to fill out the data collection forms.

Data collection tools

Tilburg Frailty Indicator (TFI): The Turkish validity and reliability of the scale developed by Gobbens et al. was conducted by Arslan et al. (15,16). The Cronbach's alpha coefficient of the Turkish version was 0.76 (16,17). The scale consists of two parts. The first part evaluates the determinants of frailty with ten items. The second part is divided into three domains (Physical, psychological, and social components), which are evaluated with a total of 15 items. Eleven items of the TFI have 2-way response categories: "yes" and "no". Four items of the TFI have 3-way response categories: "yes", "sometimes", and "no" (15). The total score that can be obtained from the scale ranges from 0 to 15, and a score of ⩾5 indicates positive frailty (17). High scores point to a high risk of frailty.

Geriatric Pain Scale (GPS): The scale was developed by Ferrell et al. in 2000 for geriatric outpatients (18). The multidimensional scale includes 24 items and is easy to administer. The Turkish validity and reliability study of the scale was conducted by Dursun and Bektaş (19). The Cronbach's alpha was 0.85. The scale consists of five subdimensions: withdrawal due to pain, severity of pain, pain due to motion, pain due to strenuous activities, and pain due to other activities. There are 22 yes/no questions and two items are scored on a 0-10 scale. The total score is calculated by summing the "yes" answers to 22 questions and the score of two items on the 0-10 scale. Thus, the total score varies between 0-42. The conversion of the scale into a system of 100 is performed by multiplying each item with a coefficient of 2.38, and in this case, the highest score that can be obtained is 100. A score lower than 30 indicates mild pain; a score between 30-69.9 indicates moderate pain, and a score equal to or greater than 70 indicates severe pain (18,19).

Get up and Go Test (GGT): The GGT was developed by Podsiadlo et al. in 1991 (20,21). The person sits on a chair, he/she has to get up from the chair with the command given and walk to the line drawn three meters ahead, turn from there and sit down again. When the command is given, the time is started and when the person returns from the walk and sits down, the time is stopped and recorded (17). It has been reported that the GGT is a reliable and valid test to measure physical function in many patient populations, including older adults (22). The test speed of individuals with high fall risk is 12 seconds and above according to GGT (17).

Statistical analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.0. Descriptive statistics (Mean, frequency, percentage, and standard deviation) were used in the evaluation of the data. Since the data showed normal distribution according to the Shapiro-Wilk test value, T-test was performed for independent groups and paired tests for related groups, and One-way analysis of variance (ANOVA) was conducted in more than two groups. The Tukey test was performed in advanced analysis. The relationship between dependent and independent variables was investigated using the Pearson correlation and multiple linear regression method. The correlation relationships between scales were considered weak when r: 0.00-0.30, moderate when r: 0.31-0.49, strong when r: 0.50-0.69, and very strong when r: 0.70-1.00. (23). Regression analysis is a statistical tool to evaluate the correlations among variables. The unique contribution of every predictive variable was defined with the standardized regression coefficient (β) and the significance level of the coefficient (p). The test for multicollinearity was performed for regression. Predictors added to the model by variance inflation factor coefficients are less than 10, and the tolerance coefficients are greater than 0.20. The threshold for statistical significance was 0.05.

Results

The mean age of the participants was 68.20±4.34 and 50.4% were women. The mean TFI (6.70±2.82), GGT (13.76±6.94), and GPS (60.85±22.81) scores of women were significantly higher than those of men. Also, 78.1% of the participants were married and their walking time (11.28±5.74) was significantly shorter than that of the widowed (14.62±6.95). In addition, 29.4% of the older adults were illiterate and it was seen that as the level of education increased, the level of frailty and the severity of pain decreased. However, the frailty levels (7.49±3.04), pain severity (65.37±24.52), and walking time (14.40±6.38) of the illiterate participants were significantly higher than those who finished primary school or high school ($p < 0.001$). Moreover, 7.5% of the participants had a high-income level and the frailty levels (3.25±1.54), walking time (9.08±3.20), and pain severity (31.73±25.97) of this group were statistically significantly lower than those with moderate- or low-income levels ($p < 0.001$). Furthermore, 64.4% of the participants had a healthy lifestyle, while 25% stated that they had neither a healthy nor an unhealthy lifestyle, and 10.6% stated that they had an unhealthy lifestyle. One significant finding is that the frailty level (9.12±3.16) and pain severity (81.20±12.01) of individuals with an unhealthy lifestyle were higher than the other groups. Additionally, 47.3% of the participants had a chronic disease and their frailty level (6.89±2.69), walking time (13.33±7.72), and pain severity (60.56±24.24) were higher than those who did not have a chronic disease (Table 1).

Table 1. Distribution of the socio-demographic characteristics and the TFI, GGT, and GPS scores of the older adults (n=160)

Variables		N (Percentage)	TFI Mean±SD (6.11±2.94)		GGT Mean±SD (12.01±6.16)		GPS Mean±SD (53.50±27.60)	
			TFI Mean±SD	**Test**	Mean±SD	**Test**	Mean±SD	**Test**
Age 68.20±4.34	65-70	116 (72.5)	6.16±3.06	t=0.29 **p=0.76**	11.72±6.03	t=-0.98 **p=0.32**	54.24±27.25	t=0.61 **p=0.58**
	71 and +	44 (27.5)	6.00±2.60		12.81±6.51		51.54±28.73	
Gender	Male	79 (49.4)	5.51±2.94	t=-2.62 **p=0.010**	10.22±4.65	t=-3.79 **p=0.000**	45.97±30.10	t=-3.51 **p=0.001**
	Female	81 (50.6)	6.70±2.82		13.76±6.94		60.85±22.81	
Marital status	Married	125 (78.1)	5.92±2.92	t=-1.57 p=0.118	11.28±5.74	t=-2.89 **p=0.004**	51.67±28.59	t=-1.80 p=0.076
	Widowed	35 (21.9)	6.80±2.91		14.62±6.95		60.04±22.95	
Education level	Illiterate	47 (29.4)	7.49±3.04^{a*}	F=9.07 **p=0.000**	14.40±6.38^{a}	F=8.22 **p=0.001**	65.37±24.52^{a*}	F=9.47 **p=0.000**
	Primary school	81 (50.6)	5.78±2.53^{b}		11.85±6.48^{b}		52.15±25.63^{b}	
	High school	32 (20)	4.94±3.12^{b}		8.93±2.75^{b}		39.49±30.00^{b}	
Income level	Low	69 (43.1)	5.90±2.74^{a}	F=8.34 **p=0.001**	14.07±7.85^{a}	F=7.66 **p=0.001**	53.70±28.11^{a}	F=4.42 **p=0.014**
	Medium	79 (49.4)	6.73±3.00^{a}		10.67±3.93^{a}		56.63±26.20^{a}	
	High	12 (7.5)	3.25±1.54^{b*}		9.08±3.20^{b}		31.73±25.97^{b*}	
Lifestyle	Healthy	103 (64.4)	5.29±2.67^{a}	F=17.55 **p=0.001**	11.90±6.83^{a}	F=0.53 p=0.584	46.49±28.13^{a}	F=15.23 **p=0.001**
	Healthy/Unhealthy	40 (25)	6.95±2.45^{a}		11.70±4.17^{a}		59.79±21.75^{a}	
	Unhealthy	17 (10.6)	9.12±3.16^{b*}		13.47±5.91^{b}		81.20±12.01^{b}	
Chronic disease	Yes	74 (46.3)	6.89±2.69	t=3.20 **p=0.002**	13.33±7.72	t=2.44 **p=0.016**	60.56±24.24	t=3.11 **p=0.002**
	No	86 (53.8)	5.44±2.99		10.88±4.13		47.43±28.89	
Pain severity	Mild	35 (21.9)	3.20±2.11	F=51.58 **p=0.001**	9.11±1.96	F=7.66 **p=0.001**	12.51±11.01	F=443.49 **p=0.000**
	Moderate	73 (45.6)	5.96±2.17		11.87±4.46		52.42±12.40	
	Severe	52 (32.5)	8.29±2.56		14.17±8.79		82.61±7.69	
Frailty	Frail	112 (70)	7.58±2.13	t=18.60 **p=0.001**	12.56±6.80	t=1.71 p=0.089	63.75±21.77	t=8.68 **p=0.001**
	Not frail	48 (30)	2.69±1.17		10.75±4.12		29.60±25.00	
Risk of falling	Yes	59 (36.9)	7.00±2.77	t=-2.99 **p=0.003**	17.15±7.57	t=8.14 **p=0.001**	66.43±21.09	t=-5.21 **p=0.001**
	No	101 (63.1)	5.59±2.89		9.01±1.61		45.95±28.24	
Groups	Stage III	50 (31.3)	7.12±2.18^{a}	F=46.57 **p=0.001**	11.46±4.05^{a}	F=13.85 **p=0.001**	63.83±13.46^{a*}	F=235.17 **p=0.001**
	Stage IV	50 (31.3)	7.84±2.54^{a}		15.38±8.82^{b*}		78.92±10.50^{b*}	
	Control	60 (37.5)	3.83±2.30^{b*}		9.68±2.97^{a}		23.72±16.48^{c*}	
Health status	GA	100 (62.5)	7.48±2.38	t=9.488 **p=0.001**	13.42±7.11	t=4.62 **p=0.000**	71.37±14.20	t=19.32 **p=0.001**
	No GA	60 (37.5)	3.83±2.30		9.68±2.97		23.72±16.48	

^{a,b,c} Groups with different letters are different from each other, * This group is different from the others

In the present study, 70% of the participants were frail, 45.6% had moderate pain, 36.9% were vulnerable due to the risk of falling, and 62.5% had GA. Older adults felt moderate pain (53.50±27.60) according to the GPS, were frail (6.11±2.94) according to the TFI, and had a risk of falling (12.01±6.16) according to the GGT. The GPS scores indicated that the level of pain was mild in 21.9% of the participants (12.51±11.01), moderate in 45.6% of the participants (52.42±12.40), and severe in 32.5% of the participants (82.61±7.69) (Table 1). The comparison of pain severity and frailty levels revealed that the group with severe pain (8.29±2.56) was statistically significantly frailer than those with moderate (5.96±2.17) and mild (3.20±2.11) pain ($p < 0.001$). The mean GGT score (9.11±1.96) of the participants with mild pain levels was significantly lower than that of the participants with moderate (11.87±4.46) and severe (14.17±8.79) pain ($p < 0.001$). The pain severity of frail older adults (63.75±21.77) was approximately three times higher than that of non-frail (29.60±25.00) older adults ($p < 0.001$). Another statistically significant finding is that the frailty level (7.00±2.77), walking time (17.15±7.57), and pain severity (66.43±21.09) of the participants who had a risk of falling were higher than those without the risk of falling ($p < 0.001$).

The frailty (3.83±2.30) level of the elderly in the healthy group was significantly lower than that of the elderly with stage III (7.12±2.18) and stage IV (7.84±2.54) GA ($p < 0.001$). Pain severity was the highest in those with stage IV GA (78.92±10.50) compared to the other groups, and the pain severity of the participants with stage III GA (63.83±13.46) was higher than that of the participants in the healthy group (23.72±16.48) ($p < 0.001$). Older adults with stage IV GA (15.38±8.82) had significantly higher GGT scores ($p < 0.001$). The mean TFI (7.48±2.38), GGT (13.42±7.11), and GPS (71.37±14.20) scores of the participants with GA were significantly higher than the mean scores of those without GA ($p < 0.001$) (Table 1). The correlation analysis revealed a weak positive relationship ($r=0.168$; $p=0.034$) between TFI score of older adults and their walking time. A strong positive relationship was observed between pain severity and frailty levels of older adults ($r=0.690$; $p=0.001$) (Table 2). Since the level of significance is $p<0.001$, the established regression model is significant. The R^2 value, which is the explanatory power of the model, was calculated as 0.477 ($R^2=0.477$; $p=0.000$). This value indicates that pain severity of the patients accounted for 47.7% of the frailty level of the participants aged 65 and over (Table 3).

Table 2. Pearson's correlation coefficients for the relationship between TFI, GGT, GPS in older adults with Gonarthrosis

Scales		TFI	GGT	GPS
Tilburg Frailty Indicator (TFI)	r	1	0.168	0.690
	p		0.034	0.001
Get up and Go Test (GGT)	r	0.168	1	0.316
	p	0.034		0.001
Geriatric Pain Scale (GPS)	r	0.690	0.316	1
	p	0.001	0.001	
r: pearson korelasyon				

Table 3. Geriatric Pain Scale (GPS) and frailty scale regression analysis

Variables	Unstandardized beta coefficient	SE	Standardized beta coefficient	t	p
Constant	2.169	0.371	-	5.851	0.001
GPS	0.074	0.006	0.690	11.997	0.001

Multiple linear regression analysis was performed to determine the predictive level of the TFI score of the group without GA and the group with GA stages III and IV, the severity of pain, the mild group and the people with moderate and severe pain (Table 4). When the results of the analysis were assessed, it was determined that the model created was statistically significant (β0 (95.0% confidence interval=3.200) (2.456-3.944); $F=30.347$, $p < 0.001$). In the model created, independent variables constitute 42.5% of the dependent variable. The TFI score was 1.913 times higher in the stage III GA group and 1.798 times higher in the stage IV GA group compared to those without GA. The TFI score was 1.520 times higher in the moderate group and 3.260 times higher in the group with severe pain compared to the group with low pain intensity.

Table 4. The effect of pain and Gonarthrosis variables on Tilburg frailty scale by linear regression analysis

Model 1 (Dependent Tilburg Frailty Indicator) F: 30.347; p<0.001; R^2:0.439; Adjusted R^2:0.425; Durbin Watson:1.756			
Factors	Unstandardized beta coefficient (95.0% CI)	Standardized beta coefficient	p
Constant	3.200 (2.456-3.944)	-	0.001
Groups (No Gonarthrosis)			
Evre III Gonarthrosis	1.913 (0.798-3.028)	0.303	0.001
Evre IV Gonarthrosis	1.798 (0.476-3.120)	0.284	0.008
Pain severity (Mild)			
Moderate	1.520 (0.367-2.673)	0.258	0.010
Severe	3.260 (1.730-4.789)	0.521	0.001

Discussion

Many studies have shown that gender has an effect on frailty, and being a female increases the probability of frailty and the severity of pain (1,22,24-27). Consistent with the literature, the female participants in our study were frailer (6.70±2.82) and to experience more severe pain (60.85±22.81). However, in their study examining GA and frailty in individuals aged 60 and over, Misra et al. (2015) reported that gender had no effect on frailty (28). In addition, our study found that age had no effect on frailty and pain severity. Contrary to our findings, in their study with Chinese older adults, Lee et al. (2014) found that age and GA were strongly associated with frailty (29). Similarly, Bindawas et al. (2018) reported that there is a significant relationship between age and frailty in patients with GA (14).

Consistent with many studies (14,24,26,30,31) our study revealed that older adults with chronic diseases, the widowed, the illiterate individuals, and those with middle- and low-income levels and unhealthy lifestyles had more pain and frailty. Individuals with low income levels and education level generally have to work in jobs that require physical strength in order to survive. Susceptibility to OA may increase in these people with advancing age due to the inappropriate use of body mechanics. Veronese et al. (2017) reported that the participants in the OA group with pain performed more challenging tasks that required physical effort before retiring compared to the group without OA (1). In addition, individuals with a low level of education tend to have an unhealthy lifestyle, insufficient physical activity, unhealthy diet, and less adherence to treatment. These factors contribute to the increased incidence of pain and frailty in individuals aged 65 and over with OA.

Pain is one of the most common clinical findings in older adults with GA. Our findings showed the severity of pain in older adults to be moderate (53.50±27.60). Similar to our study, many studies conducted with older adults with OA (3,19,30-32) reported the severity of pain to be moderate. In our study, 21.9% of the participants had mild, 45.6% had moderate, and 32.5% had severe pain. Similarly, Saka and Gözüm (2020) investigated the prevalence of pain and pain self-management practices in the elderly. They found that 21.7% of the elderly had severe pain, 50.4% had moderate pain, and 27.9% had mild pain (30).

One statistically significant finding of our study is that the pain severity of the participants with GA (71.37±14.20) was approximately three times higher than the individuals without GA (23.72±16.48). This finding may be attributed to the limitation of physical activities due to increased pain severity, which leads to undesirable outcomes adversely affecting the clinical course in OA patients, such as inactivity, muscle weakness, and obesity.

Our findings show that the frail participants (70%) have twice as much pain severity as non-frail participants ($p < 0.001$). The relationship between pain severity and the level of frailty is strong, and in this case, the increase in pain severity increases frailty. Veronese et al. (2017) investigated the relationship between the risk of developing frailty and pain in older adults with OA and found that people with OA and pain were significantly more likely to be frail than others (1). Coelho et al. (2017) examined the effect of pain in older adults on frailty and they provided important evidence to support the hypothesis that pain can accelerate and/or worsen frailty in older populations. Coelho et al. (2017) reported that pain can predict 5.8% of the possibility of frailty (24). Bindawas et al. (2018) investigated the relationship between knee pain and GA over a six-year period and proved that knee pain increases frailty and the risk of developing frailty over time (14). Consistent with the literature, our study proved the hypothesis that pain is one of the factors increasing frailty in patients with GA, a specific group of OA patients. Our study further revealed that pain severity accounts for 47.7% of the frailty level of individuals aged 65 and over. This finding indicates that pain can strongly predict frailty.

Coelho et al. (2017) found the frailty level of the older adults was 6.0 ± 3.4 according to the TFI (24). In our study, we found that the frailty level of the older adults was 6.11±2.94. Moreover, 70% of the participants were frail, and this rate was 89% for the population with GA. In addition, the frailty level of the participants with GA was double that of those without GA ($p < 0.001$). It was also revealed that there was a strong relationship between the GA of older adults and their frailty levels, which draws attention to the fact that having GA increases the level of frailty. Misra et al. (2015) conducted a multicenter study to investigate the relationship between GA and frailty and they found that in older adults GA was associated with a higher prevalence and risk of developing frailty (28). Castell et al. (2015) investigated OA and frailty among older adults in six European countries and found that the rate of frailty was 30% and the rate of pre-frailty was 51% for all countries, and they proved that frailty is more common and higher in individuals with OA than in those without OA (25). Wanaratna et al. (2019) examined the prevalence of and factors associated with frailty and cognitive frailty in older adults with OA. They also revealed that frailty was higher in patients with GA (26). However, the frailty of 12.9% of individuals with OA was lower compared to our research's findings (70%). This may be due to the fact that different scales were used to determine frailty, and also, the majority of the participants in our study were individuals with GA.

More studies are needed to explain the relationship between GA and frailty. Although the underlying mechanisms have not been clarified yet, the general opinion is that GA is associated with a decrease in physical activity levels. Wanaratna et al. (2019) found that especially those with severe GA had a slow walking speed (63.6%) (26). In our study, 36.9% of the older adults had a walking

time of 12 seconds or more according to the GGT. Consistent with the results of Wanaratna et al.'s study, one significant finding of our study is that the mean walking time (15.38±8.82) of stage IV patients with severe GA was quite high compared to other groups ($p < 0.001$). Again, the results of the GGT indicate that being a female, being widowed, low education and income level, an increase in the number of chronic diseases, and an increase in the severity of GA and pain have negative effects on walking tests (26). There are studies that obtain different results than this study. Also, Scheuing et al. in their study on the burden of OA found that women were more affected and people in high-income countries were at greater risk (33).

Similar to some studies conducted in Turkey in recent years (32,34,35), our study concluded that pain severity in older adults increased with the increase in the GA stage. In addition, the recent international literature has revealed that pain complaints increase with the progression of the disease stage in individuals with OA (14). Our research shows that having stage IV GA increases the severity of pain by 3.26 times. Therefore, it is thought that individuals with GA who prefer immobility to avoid pain contribute to the progression of the disease at radiological level.

There is a disconnect between clinical radiographic findings and patient symptoms in osteoarthritis. Inflammation, particularly synovitis, has been suggested as a possible explanation for this disconnect. This may underlie the different pain and symptoms in patients during osteoarthritis flares (36). The lack of a gold standard for assessing pain in KOA also limits research discussions (37). Although it is a single-center, limited number of studies conducted in a limited time, the findings of the present research show that age and GA cause frailty and pain. It is one of the most important factors affecting frailty in pain. The primary limitation of this study is that the data were collected from a single center over a specific period of time.

Conclusion

In older adults with OA, pain causes limitation of movement, which reduces their quality of life. For this reason, it is important to unveil the undesirable conditions that the increase in the severity of pain causes in patients with GA as this guides the clinical decision-making process. Our study revealed that sociodemographic characteristics, such as gender, marital status, education level, income level, and lifestyle of older adults and the presence of a chronic disease affect their frailty level, pain severity and functional mobility.

It has been found that the severity of pain has a strong relationship with the level of frailty and a very strong relationship with having GA. The factor that accounts for almost half of the frailty is the severity of pain. The findings prove that pain is an important factor in the clinical management of GA. Therefore, it has become important for geriatric care providers to prioritize the assessment of pain severity while creating care plans and in the clinical decision-making process. It is also crucial to educate and support older adults with GA in pain management to increase their quality of life. In addition, supporting health professionals who provide home care services in pain assessment and management may contribute to the early identification of frailty in community-dwelling older adults and to taking the necessary precautions. It may be recommended that future researchers conduct mixed methods studies on frailty and GA, presenting qualitative and quantitative data together. It is recommended to conduct research on frailty and pain in elderly patients with GA who are applied with different types of treatment.

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Ethical statement

Ethical approval for the study was obtained from the Ethics Committee of Yozgat Bozok University (29.09.2021/decision no: E-28254347-755-33231). Institutional permission was obtained from the hospital where the study was conducted. Permission was obtained from the developers of the scales used in the study.

Conflicts of interest

The authors declare no conflict of interest.

Author contributions

Conceptualization: A.A., D.Y.G., M.K.; Research design: A.A., D.Y.G., M.K.; Data collection and/or Processing: A.A., D.Y.G., M.K., M.S: Analysis and/or Interpretation: A.A., D.Y.G; Literature review: A.A., D.Y.G., M.K; Writing up the original draft: A.A; Review and Editing: A.A., D.Y.G., M.K., M.S.

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