Evaluation of the relationship between lower urinary tract symptoms and fall risks in male patients over 65 years old

Saliha Buşra Aksu[1], Güzin Zeren Öztürk[2], Memet Taşkın Egici[3], Cüneyt Ardıç[4]

[1] Family Medicine, Aslanapa District State Hospital, Aslanapa/Kütahya, Turkey; [2] Family Medicine, Health Science University Şişli Hamidiye Etfal Training and Research Hospital Şişli/İstanbul, Turkey; [3] Family Medicine, Health Science University Haydarpaşa Numune Training and Research Hospital Kadıköy/İstanbul, Turkey; [4] Family Medicine, Recep Tayyip Erdoğan University Medicine Faculty Rize/Turkey

Objective. In our study, we aimed to evaluate the relationship between LUTS and fall risk in patients over 65 years old.

Methods. 183 people over 65 years old who attended to Health Sciences University Şişli Hamidiye Etfal Training and Research Hospital Family Medicine Polyclinics and Recep Tayyip Erdoğan University Family Medicine Polyclinics between February 2017-May 2017 were included in the study and 'Individual Presentation Form' prepared by the researcher questioning socio-demographic characteristics was applied to the participants by face-to-face questioning method, International Prostate Symptom Score (IPSS) and Morse Fall Scale (MFS) were completed afterwards and ROC analysis of IPSS was performed for those who have high risk in terms of MFS.

Results. When evaluating the relationship between MFS and IPSS, we observed that as all subscores and total score of IPSS increased, the MFS score increased. The MFS scores of the participants whose IPSS classification was evaluated as severe were found to be significantly higher. ROC analysis of IPSS was performed for those who have high risk in terms of MFS. It was found that area under curve is 78.4%, and those with an IPSS of 13.5 and above show a high fall risk with 71.4% sensitivity and 70% specificity.

Conclusions. In our study, we found that as the IPSS of the participants increased, the risk of falling increased. Moreover, we found that age, occupation type, type and number of chronic diseases were effective in both fall and IPSS. In addition to LUTS screening in males, evaluation should be done for the risk of falling.

Key words: prostate, accidental falls, elderly

INTRODUCTION

According to World Health Organization (WHO), the falling rate of individuals aged 65 and over is 28.0-35.0% every year, while this rate increases to 32.0-42.0% after the age of 70 [1]. In addition to the increase in certain diseases in older ages, there is a decrease in physical abilities and an increase in the risk of accidents as well. The tendency to fall increases due to various reasons, especially decrease in physical and cognitive abilities, loss of muscle strength, drug use and vision problems, and it is

reported that at least 50% of individuals over the age of 65 experience falls once a year. While some of the falls caused non-fatal injuries such as increased use of healthcare providers, decreased function and loss of independence; 10 to 20% result in serious injuries such as fractures or head injuries [2-5].

With respect to the 2017 statistics of the USA Centers for Disease Control and Prevention, 2.8 million people apply to the emergency department annually due to falls, more than 800.000 are hospitalized and more than 27.000 die in the end. While the total annual cost of injuries due to falls in 2015 was approximately 50 billion dollars, the amount is currently approaching 70 billion dollars [6]. Determining the risks for falling and taking precautions are among the best protection methods. A meta-analysis [7] showed that fall prevention programs reduced the risk of falls by 11%, while a systematic review [8] showed that multidimensional interventions reduced the risk of falls by 27% in the elderly living in the community.

Lower urinary tract symptoms (LUTS) are the subjective indicator of a disease or change that affects bladder and the urethra as perceived by the patient, caregiver or partner and traditionally classified into storage, voiding and post micturition symptoms [9]. LUTS is seen in 15-60% of men over the age of 40, and its incidence increases rapidly with age [10]. Sypmtoms as increase in the frequency of urination(need to urinate more than 8 per day), nocturia (need to urinate at night), urgency (sudden and non-delayed urination), urinary incontinence not only negatively affect the quality of life, but also may cause accidents and falls [11,12].

Recent studies have shown that Bening prostate obstruction-related parameters (prostate volume, post-void residual, peak flow rate) have an inverse relationship with prostate cancer (PCa), The addition of parameters like age and PSA significantly increases the models' accuracy in predicting PCa [13]. Simirlarly, when patients diagnosed with prostate cancer were compared with patients diagnosed with BPH; a study found that age and PSa values to be higher and IPSS values to be lower in PCa group [14]. Nevertheless Falagario et al. found age as the most important predictor in the diagnosis of PCa in their study, especially in those with a PSA value of up to 10 ng/ml, this risk was found to be 5 times higher than in younger counterparts [15]. Therefore, the final clinical decision has to rely on wise clinical judgment.

In our study, we aimed to evaluate the relationship between LUTS and fall risk in patients over 65 years old.

MATERIALS AND METHODS

The population of this descriptive prospective study composed of men over 65 years old who had been admitted to Health Sciences University Şişli Hamidiye Etfal Training and Research Hospital Family Medicine Polyclinics and Recep Tayyip Erdoğan University Family Medicine Polyclinics for any reason and agreed to participate in the study between February 2017-April 2017. The number of male patients aged 65 and over who applied to both outpatient clinics in the last three months was 350. The sample size was calculated with 95% confidence over this attendence number and was determined as 183. In this 3-month period, we aimed to carry out our study with 183 patients who met the appropriate criteria. Men at the age of 65 and over who agreed to participate in the study were included in the study. Patients with a history of previous urological operation, a history of prostate cancer, a history of urinary incontinence or previously treated for this reason were not included in the study.

'Individual Presentation Form' prepared by the researcher questioning socio-demographic characteristics (age, occupation, education level, monthly income, history of previous diseases) was applied to the participants by face-to-face questioning method, and the International Prostate Symptom Score (IPSS) and Morse Fall Scale (MFS) were completed afterwards. Information of 200 patients was obtained, but 17 of them were not included in the study because they did not have the appropriate criteria.

INTERNATIONAL PROSTATE SYMPTOM SCORE

The International Prostate Symptom Score consists of 8 questions, 7 questions regarding the symptoms associated with benign prostatic hyperplasia and 1 question for the quality of life. The version developed by the American Urological Association in 1992 did not contain the question of quality of life and was named the American Urological Association Symptom Score (AUA-7), later it was named IPSS after the World Health Organization added the eighth question.

Questions 2, 4 and 7 in the IPSS form question storage symptoms, while questions 1, 3, 5 and 6 ask about voiding symptoms. Symptom score total score can range from 0 to 35 (excluding quality of life). In clinical use, the symptom level is divided into three groups; mild for 0-7 points, moderate for 8-19 points and severe for 20-35 points [16,17].

MORSE FALL SCALE

Morse Fall Scale was developed by Janice M. Morse in 1985. The MFS consists of six items (a history of falling in the past three months, secondary diagnosis, ambulatory aids, intravenous therapy, gait, and mental status) with mutually different scores, which are attributed to each patient and can range between 0 and 125 points.

Patients classified between 0 and 24 points are at low risk of falls during the hospitalization; patients classified between 25 and 44 points are at moderate risk of falls; and patients with 45 points or more are at high risk of falls. At the cut-off score of 45, sensitivity was established at a value of 78%, specificity was established at a value of 83% [18].

Ethics committee approval for the study was given by the Recep Tayyip Erdogan University Clinical Research Ethics Committee and was obtained with the 2018/61 protocol of the relevant committee dated 30.03.2018.

The IBM SPSS version 20 (Statistical Package for the Social Sciences) program was used for statistical analysis and $p < 0.05$ was considered significant. The socio-demographic data obtained were evaluated with their number and percentage dispersions. Descriptive statistics are shown as mean ± standard deviation for continuous and discrete numerical variables, and categorical variables as the number of cases and (%). Categorical variables were analyzed using Pearson's Chi-Square test. Whether there is a statistically significant relationship between continuous and discrete numeric variables was investigated using Spearman's Correlation test.

RESULTS

The sociodemographic characteristics of the men in the study were evaluated and are shown in Table I. A total of 183 men participated in the study; the average age was 71.47 ± 6.04 (min: 65, max: 88).

The IPSS mean of the participants were 10.38 ± 8.09. In clinical use, the International Prostate Symptom Score levels are divided into three groups; 0-7 points mild, 8-19 points moderate, 20-35 points severe, In Figure 1, the distribution of the participants according to the groups was given and most of them had mild symptoms (48.1%; n = 88).

Table I. Sociodemographic characteristics.

		N	%
Age groups	65-74	127	69,4
	75-84	50	27.3
	≥ 85	6	3.3
Education level	Illiterate	19	10.4
	Below High School	125	68.3
	High School and above	39	21.3
Occupation	Blue-collar	122	66.7
	White-collar	61	33.3
Secondery diagnosis	Yes	135	73.8
	No	48	26.2

The MFS mean of the participants were 13.57 ± 14.65. According to the Morse Fall Scale, patients are evaluated in the low risk group if they score between 0-24 points, in the medium risk group if they score between 25-50 points, and in the high risk group if they score 51 points or more. In Figure 2, the distribution of the participants according to their MFS scores was given. 86.9% (n = 159) of the participants were found to be at low risk group.

The relationship between the sociodemographic characteristics, MFS scores and IPSS of the participants were given in Table II. While there was a significant relationship between MFS, age and having a blue-collar job (p: 0.039, p: 0.000 respectively), a significant relationship was found only between IPSS and having a blue-collar job. (p: 0.009)

The most common disease among the participants was hypertension (HT) with 63.9% (n: 117) and it was followed by diabetes mellitus (DM) (26.2%, n: 48). The relationship between the chronic diseases of the participants, MFS scores and IPSS were given in Table III. Considering the relationship between the number of chronic diseases and the scores, the MFS and IPSS of the participants with 3

Table II. The relationship between the sociodemographic characteristics, MFS scores and IPSS of the participants.

		Morse Fall Scale Score	P	R	IPSS total	P	R
		Mean Rank			Mean Rank		
Age*		13.57	**0.039**	0.152	10.38	0.141	0.109
		Mean ± std. deviation	P		Mean ± std. deviation	P	
Education Level**	Illiterate	20.00 ± 18.78	0.193		14.84 ± 8.15	0.053	
	Below High School	13.98 ± 15.35			9.81 ± 7.53		
	High School and above	9.15 ± 7.12			10.05 ± 9.25		
Occupation**	Blue-collar	16.47 ± 16.35	**0.000**		11.36 ± 7.92	**0.009**	
	White-collar	7.78 ± 7.79			8.44 ± 8.14		

*Spearman's Correlation Test; **Chi-square test
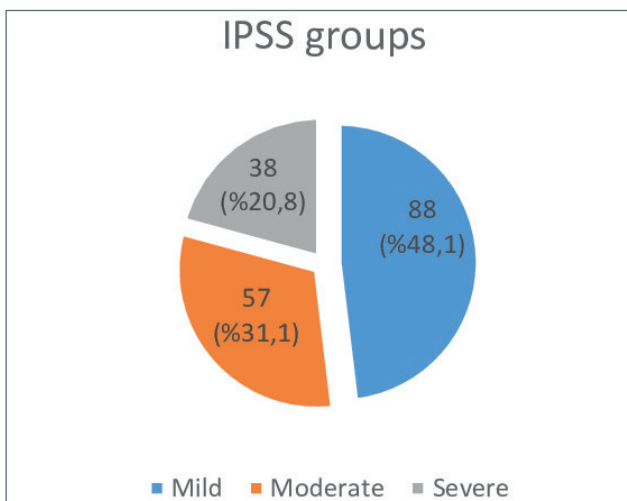
Figure 1. Distribution of the participants according to IPSS.
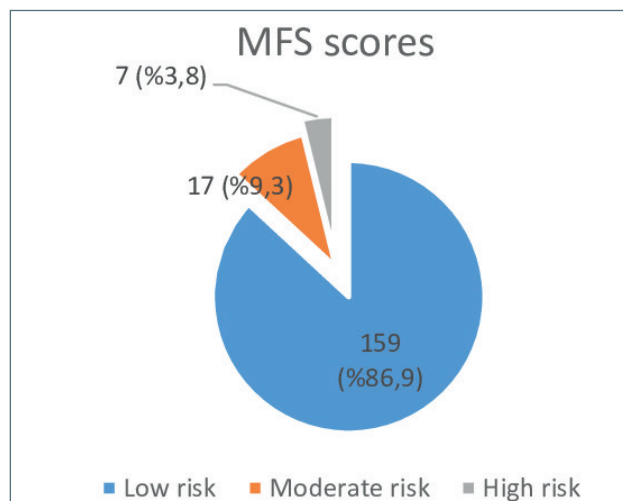
Figure 2. Distribution of the participants according to MFS.

or more chronic diseases were found to be significantly higher. (p: 0.000 and p: 0.002, respectively)

The number of patients using diuretics was 71 (38.3%), and the number of patients using antidiabetics was 48 (26.2%). A significant relationship was found between the use of diuretics, anti-diabetics, MFS and IPSS. (p: 0.001, p: 0.000, p: 0.001 ve p: 0.000 respectively) The patients using diuretic and antidiabetic drugs were found to have significantly higher MFS and IPSS.

The mean PSA of the participants was 3.11 ± 4.30, and the PSA values of 40 (25.8%) participants were above the normal limit. While there was no significant difference between the PSA scores and age (p: 0.932, r: 0.007), a significant correlation was found between PSA and

IPSS, it was as the IPSS increased, the PSA increased. (p: 0.000, r: 0.317) There was no significant relationship between PSA scores and MFS scores. (p: 0.305, r: 0.083). When evaluating the relationship between MFS and IPSS (Tab. IV); we observed that as all subscores and total score of IPSS increased, the MFS score increased. The MFS scores of the participants whose IPSS classification was evaluated as severe were found to be significantly higher. (p: 0.000) (Tab. V).

ROC analysis of IPSS was performed for those who have high risk in terms of MFS. It was found that area under curve is 78.4%, and those with an IPSS of 13.5 and above show a high fall risk with 71.4% sensitivity and 70% specificity.

Table III. The relationship between the chronic diseases of the participants, MFS scores and IPSS.

		N	Morse Fall Scale Score	P	IPSS total	P
			Median (IQR)		Median (IQR)	
Hypertension*	Yes	117	15.00 (15.00-15.00)	0.000	8.00 (5.00-20.00)	0.013
	No	66	0.00 (0.00-15.00)		6.00 (2.00-14.00)	
DM*	Yes	48	15.00 (15.00-27.50)	0.000	10.00 (5.00-23.00)	0.004
	No	135	15.00 (0.00-15.00)		7.00 (4.00-14.00)	
Chronic lung disease*	Yes	32	15.00 (15.00-15.00)	0.046	10.50 (4.50-19.00)	0.438
	No	151	15.00 (0.00-15.00)		8.00 (5.00-17.00)	
Chronic heart disease*	Yes	18	15.00 (15.00-28.75)	0.003	15.00 (4.50-23.25)	0.149
	No	165	15.00 (0.00-15.00)		8.00 (4.50-16.00)	
Thyroid disease*	Yes	13	15.00 (15.00-47.50)	0.001	18.00 (5.50-22.00)	0.041
	No	170	15.00 (0.00-15.00)		8.00 (4.00-16.00)	
Number of chronic diseases**	None	49	0.00 (0.00-0.00)	0.000	6.00 (2.00-13.50)	0.002
	1	46	15.00 (1.50-15.00)		8.00 (4.75-10.00)	
	2	42	15.00 (15.00-15.00)		8.50 (4.75-20.00)	
	3 or more	46	15.00 (15.00-32.50)		16.00 (5.00-23.00)	

*Mann-Whithey U Test; **Kruskal Wallis Test

DISCUSSION

Falls are not generally due to a single cause, but occur as a result of the effect of preparatory and accelerating factors. Although it is difficult to try to correct all the underlying causes, a properly structured intervention can reduce the frequency of falls. The American Geriatric Association recommends that primary healthcare providers evaluate all older adults at least once a year for falls, frequency of falls, gait and balance disturbances [19]. In our study, we found that the risk of falling increases with increasing age, in accordance with the literature [20]. The main problem that falls cause in the elderly is that the injuries are more severe and the recovery is longer [21]. Although there are no compatible studies in the literature, we found that the MFS scores of the participants who worked as blue-collar before were significantly higher than those who worked as white-collar. We think that the reason for this may be related to the fact that people who worked with body strength rather than desk jobs have more staleness.

Evaluating the relationship between chronic diseases and MFS, we found that those with 3 or more chronic diseases had significantly higher MDI scores. The relationship between the number of chronic diseases and the risk of falling was found similarly in a study conducted in Canada [22]. When the diseases were examined separately; patients with HT, DM, CLD, heart diseases and thyroid diseases had a significantly higher MFS score. Results are consistent with the literature [23,24].

It is known that both the hypertension disease itself and the treatments given cause orthostotic hypotension [25,26] and it has been shown that people with orthostaic hypotension and uncontrolled HT have 2.5 times the risk of falling compared to those who do not [27]. According to the list published by The National Board of Health and Welfare (NBHW) in Switzerland, diuretics are on the list of drugs that can cause orthostatic hypotension, so they may increase the risk of falls [28]. In our study, we found that patients using diuretics had higher MFS scores.

Having diabetes has previously been associated with risk of falling. Krauss et al. found a significant relationship between the use of antidiabetic drugs and the risk of falling [29]. In our study, we found a relationship between DM, antidiabetic drug use and MFS scores. One of the potential reasons for this may be that diabetes medications cause hypoglycemia to cause falls, or may be the consequences of diabetes complications such as peripheral neuropathy or polyuria [30].

Similar to our study; Recent studies have shown that the risk of falling is increased in patients with COPD. Although the exact mechanism is unknown, skeletal muscle dysfunction and cerebal hypoxemia are blamed factors [31,32].

Table IV. Evaluation of the relationship between the participants' MFS scores and IPSS.

	Morse Fall Scale Scores	
	P-value	R-value
IPSS 1 (incomplete emptying)	0.000	0.293**
IPSS 2 (frequency)	0.016	0.177*
IPSS 3 (intermittency)	0.008	0.194*
IPSS 4 (urgency)	0.000	0.410**
IPSS 5 (weak stream)	0.001	0.249**
IPSS 6 (straining to void)	0.001	0.236**
IPSS 7 (nocturia)	0.006	0.203**
IPSS total	0.000	0.333**

Table V. Comparison of IPSS Classification and MFS Scores.

		Morse Fall Scale Score		
		N	Median (IQR)	P
IPSS classification	Mild	88	15.00 (0.00-15.00)	0.000
	Moderate	57	15.00 (0.00-15.00)	
	Severe	38	15.00 (15.00-21.25)	

In a study conducted with 5015 participants in Brazil, similar to our study, an increase in the IPSS was found as the age increases [33]. In our study, a relationship was found between IPSS and working as a blue collar and having DM, HT, and TD. It is known that diabetes mellitus causes defects in bladder emptying and urgency [34]. For this reason, it is expected that IPSS of DM patients are significantly higher.

The mean PSA of the participants was 3.11 ± 4.30, considering the age of the participants, the reason for the low PSA values may be because we included urologically healthy individuals in the study and excluded those with a history of prostate CA and operation. Looking at the studies evaluating the relationship between PSA and IPSS; Favilla et al. [35] and Tsukamoto et al. [36] did not find a significant correlation between PSA and IPSS in their studies, while Soo Park et al. [37] found a significant correlation between PSA and IPSS similar to our study. In the literature, there are studies showing that LUTS is a factor that increases the risk of falls in the elderly, especially nocturia and urinary incontinence increase the possibility of falls [38,39]. In a descriptive study conducted in a geriatric hospital, it was found that most of the falls occurred between the patient's room and the toilet or in the toilet itself [40]. Between 20 and 50% of falls in institutions have been associated with toilet facilities [40]. In a population-based study conducted with 658 people, a significant relationship was found between increased voiding frequency and hip fracture [41]. Again, Parsons et al. found that the frequency

of urination increased the risk of falling [42]. Chiarelli et al. showed that lower urinary tract symptoms such as incontinence, urgency and nocturia can be associated with falls.[43] In a cross-sectional study, the risk of falling was found to be significantly higher in patients with nocturia at least twice a night [39]. In our study a significant relationship was found between all sub scores and total score of IPSS and MFS scores. Studies and results show that a common urological disorder causes a non-urological morbidity. Although LUTS seen in the elderly is considered as a natural consequence of aging and a relatively harmless condition, studies prove that there are strong links between urinary health and physical health. Considering the frequency of LUTS and the consequences that may occur with falls, healthcare professionals should question all patients in the risky group in terms of urinary symptoms. In our study, the risk of falling was found to be high in patients with an IPSS of 13.5 and above, with a sensitivity of 72%. When assessing fall risk, clinicians' use of a form that questions urinary symptoms, such as the IPSS, may increase predictability. With appropriate treatment, urinary symptoms should be relieved. In the management of male LUTS, it is equally important to treat the prostate and also bladder and urethra to increase the chances of treatment success so that morbidity could be avoided [44].

Our study has limitations. It is known that urinary incontinence is also a factor that increases falls, but we did not include patients with urinary incontinence in the study. We also evaluated patients only at their first out-patient visit, and did not reassess their condition after treatment or recommendations.

CONCLUSIONS

In our study, we found that as the IPSS of the participants increased, the risk of falling increased. In addition, we found that age, occupation type, type and number of chronic diseases were effective in both fall and IPSS.

In addition to LUTS screening in males, we think that evaluation should be done for the risk of falling.

Ethical consideration

Ethics committee approval for the study was given by the Recep Tayyip Erdogan University Clinical Research Ethics Committee and was obtained with the 2018/61 protocol of the relevant committee dated 30.03.2018.

Acknowledgement

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