The Relationship Between Individual Perception of Perceived Susceptibility of Fall Risk and Fall Risk Level among Elderly Adult Patients Admitted in Acute Care Setting in a Saudi Arabian Hospital (KSFAH)

Zuhur Altaymani, PhD, RN, MSN, BSN.   Primary researcher
Nursing Education Manager at KSFAH (king salman forces armed hospital)
zuhuraltaymani@gmail.com
Dana M. Hansen Ph.D., APRN, ACHPN, FPCN
Associate Professor
dhansen1@kent.edu

Amy Petrinec, PhD, RN
Associate Professor
apetrine@kent.edu

Jo A. Dowell, PhD, APRN-CNP, PNP, FNP-BC, CFNE
Associate Professor, Co-Director of PhD Program
Email: jdowell1@kent.edu
Donna J. Bernert, PhD, LSHE
Associate Professor, Health Education & Promotion
Email: dbernert@kent.edu

Abstract

Falls are a significant public health concern for the elderly population. This study investigates the relationship between individual perception of perceived susceptibility to fall risk and fall risk level among elderly adult patients admitted to an acute care setting in a Saudi Arabian hospital. A convenience sample of 150 patients aged 60 to 89 years was enrolled in the study. The perceived susceptibility to fall risk was measured using a scale with high internal consistency (Cronbach's alpha = 0.87). Fall risk was assessed as a dichotomous variable (No Fall Risk or High Fall Risk). The results revealed a significant association between individual perception and fall risk level, with higher perceived susceptibility scores in patients classified as No Fall Risk compared to those in the High Fall Risk group (p < 0.001). The study also explored the impact of demographic variables, frailty, and high-risk medications on fall risk. Binary logistic regression analysis indicated that age and frailty were positively associated with an increased fall risk, while the use of certain high-risk medications was associated with a decreased risk. These findings contribute to the understanding of how individual perceptions and frailty influence fall risk and can inform the development of targeted fall prevention interventions for elderly patients in acute care settings. This research adds to the limited existing literature on perception and fall risk, particularly in the context of the Saudi population, and provides valuable insights for healthcare practitioners seeking to enhance fall prevention programs and patient outcomes.

Keywords: *Individual Perception; Perceived Susceptibility; Fall Risk; Elderly Adult; Frailty; Saudi Arabia*

1. Introduction

Fall-related injuries are a major public health concern among the elderly. Each year, one in every three persons aged 60 and older falls (Chopik et al., 2018). Individual perceptions of falls among older persons, or the "elderly," differ between cultures and generations, hence no precise description exists. Other variables that contribute to the concept of 'elderly' include social, economic, and temporal aspects, such as frailty, which is found in 80% and 85% of elderly men and women, respectively (Chopik et al., 2018). Globally, anyone above the age of 60 is considered elderly, and there were around 810 million elderly people in 2012, with two-thirds of them living in developing nations. This figure is expected to rise to two billion by 2050. In 2012, there were 1.4 million Saudis over the age of 60 in Saudi Arabia alone. By 2050, the figure is predicted to rise to 10 million.

The individual's perception of fall risk is a crucial determinant in falls among the elderly. Individual views of vulnerability, severity, obstacles, and advantages are examined using the Health Belief Model (HBM). Individual fall perceptions in the elderly are studied infrequently, and especially less so in the Saudi population.

Many of the variables that increase the likelihood of falls in any context are directly related to risk factors present at the time of the fall and may be intrinsic or extrinsic (Sihag et al., 2021). Age, past falls, co-morbidities, walking style, visual, auditory, or cognitive impairment, and musculoskeletal difficulties are some of the fundamental variables.

Environmental circumstances, mobility challenges, the environment, assistance equipment in toilets, lighting, footwear, and medications such as opioids, benzodiazepines, and some antidepressants are examples of extrinsic factors (Graham, 2012; Huynh et al., 2020; Sihag et al., 2021). Heart drugs, such as anti-hypertensives, analgesics, and diuretics, as well as the overall number of medications taken by a patient, are also strongly connected with falls (Fonad, 2022). Cardiac medicines and analgesics have been identified as one of the major risk factors in adult falls, particularly in patients over the age of 65 due to concomitant co-morbidities (Hohtari-Kivimäki et al., 2021; Fonad, 2022; Jindal et al., 2019).

Falls in the community appear to be a possibility at times. Hospitals must create a safe atmosphere while still providing high-quality patient care. Despite the availability of fall prevention methods, up to 12% of patients in the United States (700,000 to 1,000,000) fall at least once during their hospitalization (Graham, 2012; Kalisch et al., 2012; WHO, 2015). Falls with injury, on average, lengthen hospital stays by 6.3 days and add roughly $13,000 to total hospital expenses (WHO, 2015). The predicted cost for hospitals to treat these injuries by 2021 is $54.9 billion (WHO, 2015). Examining linkages between intrinsic and extrinsic factors guided the science around fall perceptions of elderly Saudi Arabia hospitalized patients, given the enormous impact on patients and health systems.

1.1 Problem Statement

With an aging population, there are considerable direct and indirect implications on healthcare systems from the accompanying increase in falls. We still don't know what variables lead older

persons to put themselves at risk of falling, despite tools and other measurements to assess fall risk and countless methods to help prevent falls.

The perception of an individual is complicated and multi-dimensional. It serves as the foundation for a person's decision-making process (Glanz et al., 2002; Salovey & Steward, 2004), and its distinguishing characteristics include awareness and comprehension. The current literature has examined patient perception in relation to topics such as patient engagement and self-efficacy, but fall risk has received less attention (Garcia et al., 2012).

1.2 Research Objective

The aim of this study was to examine the relationship among individual perceptions related to risk for falling by examining their perceived susceptibility frailty, and fall risk level (no risk, high risk) among older adult patients admitted in an acute care setting in a Saudi Arabian Hospital (KSFAH).

1.3 Research Question

There is a relationship between individual perception of perceived susceptibility to fall risk and fall risk level among elderly adult patients admitted an acute care setting in a Saudi Arabian hospital (KSFAH)?

2. Literature Review

2.1 Fall Risk Factors

The risk of falling increases with the number of risk factors present, and the prevalence of numerous risk factors increases with age, according to Sharif et al. (2018). Falls are caused by a variety of factors, which can be classified into four categories

(one intrinsic and three extrinsic): biological factors such as age, gender, chronic illness, physical and cognitive decline; socioeconomic factors such as low income, a lack of community resources, limited access to health and social services, and inadequate housing; environmental factors such as poor building design, poor lighting, slippery floors and stairs, and cracked or uneven sidewalks; and behavioral factors like multiple medication use, lack of exercise, inappropriate shoes (Huynh et al., 2020; Sharif et al., 2018).

Patients' individual perceptions of fall risk are influenced by variables such as a lack of awareness and understanding about their disease, a lack of social support, and a lack of self-control or motivation to engage in health promotion behaviors (Ahn & Oh, 2018). The impact of these elements varies from community to community. Despite a growing body of research indicating characteristics that raise awareness of perceived fall risk in older patients, few studies have looked into those aspects in the Saudi population.

2.2 Patient Falls in Saudi Arabia

There is one known Saudi Arabian study that identifies risk factors associated with falls injuries among patients at the King Abdul-Aziz University Hospital (Bergen et al., 2016). The data from 108 participants (58 who had fallen, 50 who acted as a control group) revealed that 98% had fall-related hospitalizations, 85% of which were complicated by fractures, and 12% by cerebral bleeding. Patients over the age of 60 were more likely to fall and have a fall history (p 0.001), self-identified as nonsmokers (p 0.001), and had a fall-related hospitalization (p 0.001). Those having a history of anemia were less likely to fall [28 (48%) (p 0.001)] than those who were not anemic. Individuals are

at a high risk of experiencing multiple falls, with the possibility of consequences such as fractures. More research is required to help improve patient outcomes while lowering treatment costs and the need for long-term care.

To educate patients about falls, KSAFH employs verbal education in addition to posters and handouts. All falls must be recorded to the Occurrence-Variance-Accident (OVA) system at the hospital. Even when a registered nurse delivered fall prevention education, the hospital's Quality Improvement and Patient Safety Department reported an increase in adult patient falls in the acute care setting in 2020. Few studies have shed light on the elements that influence, predict, or shape a patient's perception of fall risk. Evidence of the role of the patient's feeling of safety and fall prevention practices is particularly lacking.

In this study, a descriptive correlational, cross-sectional research design was utilized to allow the researcher to gather data on the study's variables at one point in time and evaluate the correlations between the variables (Aggarwal & Ranganathan, 2019). Correlational research is one type of non-experimental design that is used to "look for and describe relationships that may exist among naturally occurring phenomena, without attempting to alter these phenomena" (Tavakol & Pinner, 2019 p.135). No conditions were modified or adjusted in this study. A descriptive correlational, cross-sectional, non-experimental design seemed adequate.

A convenience, a nonprobability sample of all adult patients admitted to the King Salman Armed Forces Hospital (KSAFH) in an acute care unit and meeting the inclusion/exclusion criteria was used to enroll the study's 150 participants.

3. Methodology

3.1 Reliability

Table (1) Reliability

Dimensions	Item #	Items	Cronbach
Perceived susceptibility (belief about the chances of experiencing a risk or getting a condition or disease)	5	The elderly people are prone to fall	0.87
	6	Insecurities in the home and community can easily lead to falls, such as slippery floors, aisle debris, etc.	
	7	Some bad habits can cause falls, including unsuitable dressing and shoes, not using handrails, etc.	
	8	Unhealthy mental states can cause falls, such as depression	
	9	Many chronic disease and organ hypofunction can cause falls	

In the analysis for internal consistency in the reliability study of the scale, the study found Cronbach's alpha reliability coefficients for perceived susceptibility (a=0.87).

4. Results and Discussion   4.1

Demographic Characteristics

Table (2) Sample Characteristics

Demographic Variables		Frequency	Percentage
Gender	Male	65	43.3
	Female	85	56.7
Age	60-69	77	51.3
	70-79	66	44.0
	80-89	7	4.7
Marital Status	Married	141	94.0
	Divorced	9	6.0
Education	High School	78	52.0
	Diploma degree	49	32.7
	Bachelor's degree	22	14.7
	Master's degree	1	0.7
Length of Hospitalization	Less than 1 week	88	58.7
	1 week	40	53.3
	More than 1 week	22	46.7
High Risk Medications			
Cerebral Neurovascular agents	Yes	25	16.7
	No	125	83.3
Diuretics	Yes	80	53.3
	No	70	46.7
Analgesic	Yes	121	80.7
	No	29	19.3
Antihypertensive	Yes	105	70.0
	No	45	30.0
Anticoagulant agents	Yes	56	37.3
	No	94	62.7
Antidepressants	Yes	14	9.3
	No	136	90.7

Because no missing data were detected during

data screening, all 150 patients were included in the study's overall sample. The individuals' ages ranged from 60 to 89 years. The subjects were mostly male (n = 65, 43.3%) and married (n = 141, 94%). The participants held various educational degrees, with 52% holding a high school diploma and 32.7% holding a diploma degree. 14.7% earned a bachelor's degree, and 0.7% earned a

master's degree. The hospital length of stay for the week, compared to 26.7% admitted for one week majority of individuals (58.7%) was less than one and 14.7% admitted

for more than a week. Participants were on a variety of high-risk drugs, including 16.7% on cerebral neurovascular agents, 53.3% on diuretics, 80.7% on analgesics, 70.0% on antihypertensive agents, 37.7% on anticoagulant agents, and 90.7% on antidepressants.

4.2 Study Variables

Table () Independent Variable

Participant Range				
	N	Minimum	Maximum	Mean $\pm$ SD
Frailty Indicator	150	1.00	13.00	6.2 ± 3.70
Susceptibility	150	5.00	25.00	11 ± 8.8

The independent variable for this study was the perceived susceptibility.

Table () Dependent Variable

Morse Fall Scale	Number	Percentage
No Risk	43	29
High Risk	107	71
Total	150	100

The dependent variable for this study was a fall risk, which was measured as a dichotomous variable of No Fall Risk or High Fall Risk.

Table () Normality Test

Test of Normality		
	Shapiro-Wilk	
Variables	Statistic	p - value
Susceptibility	0.62	0.001

The Shapiro-Wilk test results indicate the individual perceptions of the susceptibility were not normally distributed, so a nonparametric test was utilized.

Table () Comparison of scores of the perceived susceptibility among fall of risk levels

		No Risk			High Risk		U test Statistics (Z)	p-value
	N	Median	Mean Rank	N	Median	Mean Rank		
Susceptibility	43	25.0	126.8	107	5.0	54.9	-9.82	0.001

As the data for the individual perception did not meet the assumption of normal distribution, a Mann-Whitney U test was used to compare means among fall risk levels and individual perceptions of the perceived susceptibility. The mean scores for the perception of "No Fall Risk" with participants are significantly higher than "High Fall Risk" in perceived susceptibility (p < 0.001).

Table () Comparison of Fall of Risk level among High Risk Medications

High Risk Medication	Morse Fall Scale (MFS) Risk Level				Chi-Square	*p*-value
	No Risk		High Risk			
	N	%	N	%		
Less than 3 medications	36	70.6	15	29.4		
3 or more medications	7	7.1	92	92.9	66.41	0.001
Total	43	28.1	107	71.3		

There is a link between four high-risk medications: cerebral neurovascular agents, diuretics, antihypertensive medicines, and anticoagulant drugs. Participants taking these high-risk drugs had a significantly increased chance of falling (p0.05). In terms of participants taking several medications, the risk of falling was found to be considerably higher for those taking three or more prescriptions. The results of the Chi-Square test are shown in the preceding table.

Table () Comparison of Demographic Variables and Frailty

Table () Comparison between scores of Tilburg Frailty Indicator (TFI) and Fall Risk level

Risk Level	N	Mean	Median	Mean Rank	Sum of Ranks	Mann-Whitney U	Z	*p*-value
No Risk	43	3.0	3.0	36.43	1566.50	620.500	-7.02	0.001
High Risk	107	7.5	7.0	91.20	9758.50			

A non-parametric Mann Whitney U test was utilized to identify any link between TFI scores and Fall Risk (No and High Risk), and mean rank scores of the High-Risk categories were considerably higher than the No Risk Category (p =.001).

3.4 Prediction of Fall Risk with Respect to Demographic Variables, Individual Perception Scale, and Frailty Scale

We used a binary logistic regression analysis to predict fall risk, with fall risk level as a binary dependent variable and demographic characteristics and frailty scores as independent (predictor) variables.

Table () Binary Logistic Regression Model for Fall Risk

Variables in Equation						
	B	S. E.	Wald	df	Sig.	Exp(B)
Age	1.061	.504	4.437	1	.035	2.888
Education	.140	.189	.546	1	.460	.870
Hospitalization duration	.119	.570	.044	1	.835	.888
Cerebral Neurovascular agent	20.540	5686.312	.000	1	.997	.000
Diuretics	3.644	.983	13.748	1	.000	.026
Antihypertensive	4.484	1.161	14.907	1	.000	.011
Anticoagulant agents	3.490	.940	13.790	1	.000	.030
Frailty	.980	.274	12.771	1	.000	2.664

Gender, marital status, antidepressant, and analgesics are insignificant in Block 0 (Beginning Block), so we eliminated them from the model and moved on to age, education, hospitalization duration, cerebral nervous agent medication, diuretics, antihypertensive, anticoagulant agent, and frailty scale. A statistically significant model exists, with chi-square = 69.9, p = 0.00. The model explained 53.4% of the variance in fall risk (Nagelkerke R2) and properly identified 82.7% of the cases.

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Table () Binary Logistic Regression Model for Fall Risk

Dependent Variable	Independent Variable	B	Wald	Exp(B)	Chi-Squar	p-value	Nagel-kerke R^2	Predicted % (corrected)

e

| Model 2 | Fall Risk | Susceptibility | -0.43 | 34.96 | 0.65 | 158.0 | 0.00 | 0.93 | 98.70 |

A stepwise strategy was used to build a binary logistic regression model for fall risk. First, we included all variables in the whole model, including demographic and frailty information. They were removed from the model due to significant collinearity. At that point, each individual perception was entered into the model as an independent variable on its own. Because of the high correlation between the variables, there was a significant model. We solely used binary regression to compare all individual perceptions. In all cases, there was a significant model with a negative assoc

iation to fall risk.

5. Discussion and Conclusion

There was a considerable disparity between the mean of different age groups and individual views in the context of age. Individual perception scores in older age groups were shown to be lower. This means that the older individuals in this study had a lower assessment of fall risk and were more likely to fall. Frailty was statistically higher in older age groups. This corresponds to earlier research. Age is one of the main determinants of fall risk, with the elderly experiencing the bulk of falls (Sasidharan, 2020). This is a worry for the elderly in Saudi Arabia because the majority of older patients have low educational levels, necessitating the adoption of various approaches to raise awareness of fall prevention initiatives.

Because of Saudi Arabian culture, it is not surprising that there is no association for the participants in this study. The elderly do not live alone, which is generally linked to the fact that the majority of the population remains married (divorce rates are extremely low). If the elderly were divorced or widowed, they would live with other members of their family. In this culture, risk based on gender or marital status is unusual.

Individual perceptions ($p = 0.001$) and frailty scores ($p = 0.016$) were substantially linked with educational levels ($p = 0.001$). In other research, education levels were found to have a positive correlation with fall-related individual perceptions (Sulaiman, 2018), indicating that a higher education level results in a greater awareness of "perceived severity," "perceived susceptibility," "perceived benefits," and "perceived barriers," resulting in lower fall risk. Lower education levels may explain the lack of

confidence in applying fall prevention methods in this study (Lamis et al., 2012). Elderly individuals who did not complete high school had 95% more falls than those who completed their diploma and bachelor's degree (Sulaiman, 2018; Lamis et al., 2012). This is an important conclusion of the study, and as previously stated, it highlights the necessity to build tailored fall prevention programs that are accessible for the needs of the Saudi population, because a patient's level of education likely influences their ability to adapt the information.

Medication side effects have a significant impact on fall risk. Antidepressants, anticonvulsants, analgesics, psychotropics, sedatives, anxiolytics, diuretics, and antihypertensives are among the drugs that have been linked to an increased risk of falling.

Frailty and fall risk have a strong connection (p =.001). Other studies have demonstrated frailty to be a serious health risk in the elderly. Falls have been identified as the leading cause of accidental death and injury among the fragile elderly (Siviero et al., 2022). Many studies have investigated the relationship between frailty and fall risk because both are important health issues associated with negative health outcomes (Bandeen et al., 2015; Delgado et al., 2015; Hubbard et al., 2017; Joosten et al., 2014; Samper et

al., 2011; Tom et al., 2013; Tsai et al., 2020). The studies' findings were contentious. Some studies found frailty to be a predictor of falls (Bandeen et al., 2015; Delgado et al., 2015; Hubbard et al., 2017), while others found no difference (Lin et al., 2018; Samper et al., 2011; Tom et al., 2013; Tsai et al., 2018). Frailty and high fall risk have a substantial link among the senior Saudi population, indicating the need to include a frailty scale in any fall risk prevention program or screening tool. The following section discusses frailty as a predictor of fall risk in this study.

Gender, marital status, education, and hospital stay length were all insignificant indicators of fall risk. High fall risk is connected with age and weakness. When all other independent variables were held constant, a one-unit increase in age resulted in a 2.8-fold increase in fall risk. This means that aging is a significant role in the risk of falls in patients, and every unit increase in age raises the risk of falling by about 3%.

Frailty component scores, which were generated by examining physical functionality and mental health, balance, and level of dependence, were also found to have a greater impact on fall risk. A rise in the frailty score owing to poor physical or mental health will double (2 times) the odds of falling into danger. These findings are similar to those of Siviero et al., (2022),

who discovered that greater age and frailty were substantially related to future falls among P 0.000. When combined with an intervention program to address individual perspectives, identifying frailty in the community or hospital environment may lead to a reduction in fall occurrence (Siviero et al., 2022).

All binary regression models of individual perception (susceptibility, severity, benefits, and barriers) with fall risk as a dependent variable were statistically significant, indicating a negative relationship with fall risk. It projected that strengthening individual perceptions would result in a significant reduction in fall risk. Individual perception, along with other associated characteristics such as age, education, medication intake, and frailty, is an important component of identifying fall risk. An increase in patient awareness about the perception of falls in these situations may have a major impact on fall reduction (Sharif et al., 2018). It may be concluded that changing characteristics such as age, gender, frailty level, hospital length of stay, and high-risk medicine have a substantial influence on individual perceptions, which may lead to the prediction of patient fall risk.

5.2 Importance to Advancement of Knowledge and Research

The current study described the relationships between individual perceptions of severity, susceptibility, benefits and obstacles, frailty, modifying variables, and fall risk. Because there have been few studies on perception and fall risk conducted worldwide, and none in the Saudi context, this study adds to the existing body of scientific knowledge about how perception may be related to fall risks and influence future behavior change interventions. These findings could help healthcare practitioners understand the impact of perceptions and frailty on fall prevention, improve fall risk programs, and inform future fall risk interventions.

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