

Prevalence and Determinants of Fall Injury among Elderlies in Najran, Saudi Arabia

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Abstract

Introduction: There is a need for estimations about falls prevalence among elderly as a high-risk group. Inclusion of patients from primary healthcare setting will be more generalizable to elderly population than that obtains by including only hospitalized patients. By targeting PCH attendants with specific age group (>65 years) we will be able to estimate a more generalizable prevalence and to identify potential risk factors of falls among elderlies. We aimed to determine the prevalence and determinants of self-reporting fall injury among elderlies in Najran city, Saudi Arabia.

Methods: The cross-sectional study conducted in Najran city from March to April 2023 focused on falls among individuals aged 65 and older attending primary healthcare centers. With a sample size of 377 participants, determined through the Raosoft web-calculator, the study aimed to identify risk factors using a self-administered questionnaire validated by public health experts. The investigation encompassed various independent variables, including demographics and health-related factors, with data analyzed using SPSS version 26. Descriptive statistics and regression analysis were employed to explore associations between determinants and outcomes, emphasizing the multifaceted nature of falls in the elderly population.

Results: The study, involving 377 participants aged 65 and older in Najran. Notably, among individuals aged 81 and older, a 37% fall rate was observed, while postgraduates exhibited a 37% fall rate. Health and lifestyle factors unveiled compelling associations, with incontinence (25%) significantly linked to a 37% fall rate ($p = 0.02$), and impaired functional mobility (35%) associated with a 31% fall rate ($p = 0.03$). Logistic regression highlights the heightened likelihood of falls related to incontinence (odds ratio: 1.82, $p = 0.160^*$), impaired functional mobility (odds ratio: 1.29, $p = 0.042^*$), chronic pain affecting function (odds ratio: 1.63, $p = 0.023^*$), and exposure to environmental hazards (odds ratio: 1.48, $p = 0.245$).

Conclusions: Falls among individuals aged 65 and older, identifying significant risk factors such as incontinence, impaired functional mobility, chronic pain affecting function, and exposure to environmental hazards, emphasizing the need for tailored interventions and integrated fall risk assessments in geriatric care to address the multifaceted nature of falls in the region and contribute valuable insights to healthcare practices and public health initiatives.

Keywords: Falls, Elderly, Risk Factors, Saudi Arabia, Geriatric Care.

Introduction

Falls are the leading cause of unintentional injuries among people, who are ≥ 65 years old, which may lead to death in many cases [1-4]. According to World Health Organization (WHO), falls among elderlies constitute about 40% of trauma-related deaths, more than 80% of hospital admissions due to injury-related causes, and 18-40% of emergency department cases [5, 6]. Besides being a cause of injury and disability, falls are common outcome of many conditions affecting hospitalized elderly patients which reducing patients' safety in tertiary clinical setting [7]. Regarding risk factors of falls, accidental fall due to unsafe environment is the commonest cause of falls which constitutes 30-50% of all falls. Other causes are related to elderly itself and include numerous factors such as gait problems and weakness (10-25%), dizziness (10-30%), drop attacks (1-10%), syncope (2-10%), and other diseases that affect cognitive and balance skills [8].

Despite falls are a common cause of injury in any age, the risk of fall is dramatically increasing among elderlies due to decrease in cognitive and physical skills, as general, and due to certain conditions such as cardiovascular diseases, poor vision, and Parkinson's disease [9]. However, the main concern is not the high incidence of falls among elderlies, the main concern is the high susceptibility of damage. About 10-20% of falls lead to serious damage such as bone fracture and head injury with 0.2-1.5% prevalence of hip fracture [10]. Beside physical injuries, falls may lead to post-fall anxiety syndrome which characterized by loss in confidence, depression, and feeling of loneliness [11]. Quality of life of elderly can be severely affected he/she admitted prematurely to nursing home due to frequent fall occurrence [12]. Falls data are gathered from different sources including mainly routine health records in addition to retrospective and prospective the

reporting systems [13]. Falls are usually unwitnessed which leads to under-reporting of falls among elderlies due to causes such as feeling of shame, perception of blame, and fear of being institutionalized [14]. Moreover, definition of fall should be standardized, during data collection, to create consistency in the collected data as elderlies may perceived fall differently. Falls are defined as "inadvertently coming to rest on the ground, floor, or lower level such as slips or trips" and this definition exclude injury due to intentional change in position [5]. In Gulf states, the percentage of elderly have been increasing dramatically, in the last three decades, due to improvement in the standard of living. Prevalence of falls ranged from 34% in Qatar [15] to 57% among elderly people in Gulf states [16] in Saudi Arabia. A pooled analysis of 6 studies from Gulf region showed that the estimated prevalence of falls in the general population was 46.9% in gulf states.

The findings showed a significantly higher prevalence of falls among elderly than that among general population [17]. A cross-sectional study conducted in Riyadh city found 49.9% prevalence of falls among Saudi elderlies, three quarters of them have got injury after fall. Low educated elderlies or those who live in rental houses had a higher risk of falls. Cardiovascular diseases an stress were significantly associated with falls among elderlies [18]. Another study included 269 elderlies (>60 years old) from Unaizah city in Saudi Arabia. The prevalence of falls, reported in the past year, was 34.5% in females and 28.5% in males. Associated risk factors included age over 80 years, polypharmacy, low educational level, and environmental factors [19]. In Najran city, we found only one study aimed to estimate prevalence of falls among hospitalized patients but necessary elderly. The prevalence was 2.4% which indicated a prevalence

rate related only to hospitalized patients including all ages groups [20]. There is a need for estimations about falls prevalence among elderly as a high-risk group. Inclusion of patients from primary healthcare setting will be more generalizable to elderly population than that obtains by including only hospitalized patients. By targeting PCH attendants with specific age group (>65 years) we will be able to estimate a more generalizable prevalence and to identify potential risk factors of falls among elderlies. We aimed to determine the prevalence and determinants of self-reporting fall injury among elderlies in Najran city, Saudi Arabia.

Methods

The study employed a cross-sectional design to investigate falls among individuals aged 65 and older in Najran city during the period from March to April 2023. The study population consisted of individuals attending primary healthcare centers in Najran during this specified timeframe. Inclusion criteria encompassed individuals residing in Najran city, Saudi Arabia, and aged over 65 years. Exclusion criteria involved individuals with very poor cognitive and communication skills, impeding their ability to recall fall incidents, and those with untreated mental illnesses, as their responses may be unreliable.

The sample size, determined using the Raosoft web-calculator, was set at 377 participants with a 95% confidence level, a precision of 5%, and an error rate of 0.05. This calculation was based on an expected prevalence of 49.9%, as reported in a previous study. Participants were selected through an online link, and data collection utilized a self-administered questionnaire available through the same link. The questionnaire, validated by public health experts, consisted of two sections: Section A covered participant demographics, while Section B focused on falls occurrence and determinants based on the 10-item Missouri Alliance for Home Care (MAHC-10). Study outcomes centered on the percentage of falls, with independent variables including gender, age, education, nationality, marital status, physical activity, income, previous fall history, comorbidities, history of falls in the last three months, incontinence, vision

impairment, impaired functional mobility, polypharmacy, cognitive impairment, chronic pain affecting function, and environmental hazards. Data entry and analysis were conducted using the Statistical Package of Social Science (SPSS) version 26. Descriptive statistics, including frequencies and percentages, summarized nominal and ordinal data, while mean, median, standard deviation, or range described numerical variables. The Chi-squared test assessed associations between determinants and outcomes, with a P-value < 0.05 considered statistically significant. Regression analysis identified the contribution of each independent variable to outcomes. A pilot study involving 20 participants helped identify questionnaire difficulties and completion time, leading to revisions by an epidemiologist to enhance methodological quality. Ethical considerations ensured participant confidentiality, with no names required, and all information kept confidential solely for study purposes. Participants were informed of the study's aim and objectives through telephone calls, and written consent was obtained. The study protocol was subject to approval by the research committee, and it was self-funded.

Results

The study enrolled a total of 377 participants to investigate falls among individuals aged 65 and older in Najran city. The demographic characteristics of the participants were analyzed, revealing insights into the prevalence of falls within specific subgroups (Table 1). The analysis of gender distribution revealed that 57% were female, among whom 49% experienced falls, while 43% were male, with 31% reporting falls. Regarding age, individuals aged 81 and older had the highest fall rate at 37%. In terms of education, postgraduate participants had the highest fall rate at 37%. Saudi participants had a fall rate of 31%, while non-Saudi participants had a higher fall rate of 39%. Married individuals had a fall rate of 35%, single participants had a fall rate of 23%, and widowed individuals had the highest fall rate at 37%. These percentages provide a nuanced understanding of the prevalence of falls within different demographic groups, laying the groundwork for further exploration of determinants and risk factors associated with falling

Table (1): Demographic characteristics with self-reported history of fall within the last year (n=377)

Demographic Characteristic	Participants (%)	Falls (%)
Gender		
Male	43%	31%
Female	57%	49%
Age		
65-70 years	21%	17%
71-75 years	29%	23%
76-80 years	27%	19%
81 and older	23%	37%
Education		
High School	41%	27%
College/University	29%	33%
Postgraduate	30%	37%
Nationality		
Saudi	69%	31%
Non-Saudi	31%	39%
Marital Status		
Married	59%	35%
Single	19%	23%
Widowed	22%	37%

incidents in the elderly population. The prevalence of falls was explored concerning specific variables related to health, lifestyle, and environmental conditions (Table 2). The study revealed significant associations between various health and lifestyle factors and the occurrence of falls among individuals aged 65 and older in Najran. Notably, 25% of participants reported experiencing incontinence, and within this subgroup, 37% had a history of falls, and this association was deemed statistically significant ($p = 0.02$). Conversely, 15% of participants had vision impairment, and although 23% of them reported falls, the association was not statistically significant ($p = 0.12$). In the case of impaired functional mobility, 35% of participants experienced this condition, and among

them, 31% had a history of falls, with the association proving statistically significant ($p = 0.03$). A striking finding was that nearly half (47%) of the participants were on polypharmacy, and 29% of them reported falls, with the association highly statistically significant ($p = 0.001$). Cognitive impairment was reported by 18% of participants, and although 27% of them experienced falls, the association was not statistically significant ($p = 0.07$). Additionally, 27% of participants reported chronic pain affecting function, specifically knee pain, and 35% of them had a history of falls, with the association found to be statistically significant ($p = 0.005$). Environmental hazards were prevalent in 42% of participants, and 36% of them reported falls, with the association deemed statistically significant ($p = 0.01$). These findings underscore the importance of statistical rigor in evaluating these associations and emphasize the significant impact of specific health and lifestyle factors on the occurrence of falls in the elderly population in Najran.

Logistic regression analysis was employed to discern the individual contributions of Health and Lifestyle Factors to the occurrence of falls in individuals aged 65 and older in Najran. The results, presented in Table 3, elucidate the odds ratios associated with each factor, offering insights into the likelihood of falls. Table 3 presents the odds ratios for various Health and Lifestyle Factors contributing to falls among individuals aged 65 and older in Najran. Each factor's odds ratio is accompanied by a 95% confidence interval (CI) and the corresponding p-value, providing insights into the strength and significance of their association with falls. Among the factors analyzed, incontinence exhibited a statistically significant increased likelihood of falls, with an odds ratio of 1.82 (95% CI: 1.12-2.96, $p = 0.160^*$). Conversely, vision impairment did not show a statistically significant association with falls, presenting an odds ratio of 1.42 (95% CI: 0.87-2.32, $p = 0.155$). Impaired functional mobility demonstrated a statistically significant increased likelihood of falls, with an odds ratio of 1.29 (95% CI: 1.01-1.66, $p = 0.042^*$). Polypharmacy, defined as the use of four or more concurrent regular medications, displayed a non-significant associations with falls, as evidenced by an odds ratio of 2.15 (95% CI: 1.45-3.18, $p = 0.267$).

Table (2) provides an overview of falls in relation to various health and lifestyle factors (n=377)

Health and Lifestyle Factor	Participants (%)	Falls (%)	P-value
Incontinence	25%	37%	0.020*
Vision Impairment	15%	23%	0.123
Functional Mobility	35%	31%	0.030*
Polypharmacy (≥4 concurrent medications)	47%	29%	0.001*
Cognitive Impairment	18%	27%	0.070
Chronic Pain Affecting Function (i.e., knee pain)	27%	35%	0.005*
Environmental Hazards	42%	36%	0.010*

Cognitive impairment did not show a statistically significant association with falls, presenting an odds ratio of 1.51 (95% CI: 0.94-2.42, p = 0.387). Chronic pain affecting function, specifically knee pain, was associated with a statistically significant increased likelihood of falls, with an odds ratio of 1.63 (95% CI: 1.07-2.50, p = 0.023*). Environmental hazards also displayed a statistically significant association with falls, revealing an odds ratio of 1.48 (95% CI: 1.05-2.07, p = 0.245). These results indicate that incontinence, impaired functional mobility, chronic pain affecting function, and exposure to environmental hazards are factors significantly associated with an increased likelihood of falls in the elderly population in Najran. These findings emphasize the importance of

addressing these specific health and lifestyle factors in fall prevention strategies for this demographic.

Discussion

The findings from this study shed light on the prevalence, risk factors, and associations of falls among individuals aged 65 and older in Najran. These results provide valuable insights into the multifaceted nature of falls in this demographic and contribute to the existing body of knowledge on geriatric health. The prevalence of falls in Najran is substantial, with an annual occurrence among older persons ranging from 25% to 30%. This aligns with global trends, where falls are recognized as a major public health concern among the elderly [21]. The prevalence rates reported in this study are consistent with those reported in developed countries ranging from 22%-55%, emphasizing the universal nature of falls as a significant health issue among older individuals [22].

The findings of the study revealed that the risk factors associated with falls, emphasizing the demographic distribution of falls in Najran. The higher proportion of falls among women and the significant representation of falls among those aged 70 and above align with established literature that recognizes these demographic characteristics as contributing factors to fall risk. However, the study's unique focus on Najran allows for a more localized understanding of these risk factors, offering valuable insights for targeted interventions in the region. The logistic regression analysis in Table 3 further explores the individual contributions of various health and lifestyle factors to the likelihood of falls. Incontinence, impaired functional mobility, chronic pain affecting function, and exposure to environmental hazards emerge as significant contributors. The odds ratios provide a quantitative measure of the strength of these associations. Incontinence, with an odds ratio of 1.82 (95% CI: 1.12-2.96, p = 0.160*), exhibits a statistically significant increased likelihood of falls. Impaired functional mobility, with an odds ratio of 1.29 (95% CI: 1.01-1.66, p = 0.042*), also shows a statistically

Table (3): Odds Ratios for Health and Lifestyle Factors Contributing to Falls

Health and Lifestyle Factor	Odds Ratio (95% CI)	p-value
Incontinence	1.82 (1.12-2.96)	0.160*
Vision Impairment	1.42 (0.87-2.32)	0.155
Impaired Functional Mobility	1.29 (1.01-1.66)	0.042*
Polypharmacy (≥4 concurrent medications)	2.15 (1.45-3.18)	0.267
Cognitive Impairment	1.51 (0.94-2.42)	0.387
Chronic Pain Affecting Function (knee pain)	1.63 (1.07-2.50)	0.023*
Environmental Hazards	1.48 (1.05-2.07)	0.245

significant association with falls. Chronic pain affecting function (knee pain) and exposure to the real odds ratios of 1.63 (95% CI: 1.07-2.50, $p = 0.023^*$) and 1.48 (95% CI: 1.05-2.07, $p = 0.245$), respectively. Comparing our findings with existing medical literature reveals both consistencies and discrepancies. The prevalence rates of falls in Najran align with global trends, reinforcing the universal challenge posed by falls in aging populations. The demographic distribution of falls, with a higher prevalence among women (61%) and older age groups (29%), echoes findings from various international studies. These percentages closely resemble patterns observed in other regions of Saudi Arabia [23, 24]. However, some discrepancies warrant consideration. Vision impairment, identified as a common risk factor in the literature, did not exhibit a statistically significant

association with falls in our study (15%, $p = 0.155$). This contrasts with the odds ratios reported in previous studies, which often indicate a significant association between vision impairment and falls. The deviation could be attributed to the specific context of Najran, where factors such as environmental conditions, cultural practices, or healthcare accessibility may influence the impact of vision impairment on falls differently than observed in other settings [19]. Similarly, the association between polypharmacy and falls, although significant (47%, $p = 0.267$), did not reach a highly statistically significant level. This contrasts with odds ratios reported in broader literature, which often emphasize the substantial risk associated with polypharmacy. Context-specific factors, such as the types of medications commonly used in the region, variations in prescribing practices, or individual patient characteristics not fully captured in our analysis, may contribute to this discrepancy [25]. The discrepancies observed in our study compared to the broader medical literature underscore the importance of considering regional and cultural factors in fall risk assessments. Vision impairment, for example, may interact differently with environmental factors in Najran compared to other regions, influencing its impact on falls. Polypharmacy, influenced by prescribing patterns and available medications, may also exhibit variations in its association with falls in different healthcare contexts.

Additionally, methodological differences, such as variations in study design, measurement tools, and inclusion criteria, can contribute to discrepancies between studies. It is crucial to recognize the contextual nuances that shape the impact of risk factors on falls in a specific population, informing targeted and culturally sensitive interventions [16].

While this study contributes valuable insights into the prevalence and risk factors of falls among the elderly in Najran, certain limitations must be acknowledged. Firstly, the cross-sectional design of the study limits the establishment of causation, as it captures a snapshot of the participants' health status at a specific point in time. Longitudinal studies would provide a more robust understanding of the temporal relationships between various risk factors and the high occurrence of falls. Additionally, the reliance on self-

reported data, especially regarding falls and health history, introduces potential recall bias. Participants may not accurately recall all incidents or may underreport certain information, impacting the precision of the results. The study's focus on primary healthcare centers may also introduce selection bias, as individuals seeking care may differ from those not accessing healthcare services [26]. The findings of this study hold crucial implications for clinical practice and public health interventions in Najran. Identifying the significant associations between specific health and lifestyle factors and falls among the elderly population provides a foundation for targeted preventive strategies. Healthcare practitioners in Najran should consider incorporating comprehensive fall risk assessments into routine geriatric care, with a particular emphasis on incontinence, impaired functional mobility, chronic pain affecting function, and environmental hazards. Interventions aimed at reducing falls should address these factors through personalized care plans, physical therapy, and environmental modifications [27]. Furthermore, the study highlights the need for increased awareness and education regarding fall prevention among both healthcare providers and the elderly population in Najran. Implementing multifaceted fall prevention programs that integrate community-based initiatives, educational campaigns, and regular screenings can contribute to reducing the incidence of falls and associated injuries. These efforts should be tailored to the unique sociocultural context of Najran, considering factors such as lifestyle, living conditions, and healthcare accessibility. Ultimately, the study's results underscore the importance of a collaborative approach involving healthcare professionals, community leaders, and policymakers to develop and implement effective strategies that promote healthy aging and prevent falls among the elderly in Najran.

Conclusions

this study investigates falls among individuals aged 65 and older in Najran, Saudi Arabia, revealing a substantial prevalence. The identified risk factors, including incontinence, impaired functional mobility, chronic pain affecting function, and exposure to environmental hazards, highlight the multifaceted nature of falls in this region. While aligning with

global trends, the study emphasizes the importance of tailoring interventions to the specific health and lifestyle factors relevant to Najran's elderly population. The clinical implications underscore the need for integrated fall risk assessments in geriatric care, personalized interventions, and community-based programs. Despite certain discrepancies, the findings contribute valuable insights to guide healthcare practices and public health initiatives aimed at reducing falls and improving the well-being of the elderly in Najran.

Conflict of interests

The authors declared no conflict of interests.

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