

Risk Factors for Hip Fracture among Elderly Adults in Erbil City: A Case-Control Study

عوامل خطورة كسر العظم الوركى بين البالغين المسنين في مدينة أربيل: دراسة الشاهد والحالة

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الخلاصة

الهدف: تهدف الدراسة الحالية إلى معرفة عوامل خطورة كسر عظم الورك بين المسنين في مدينة أربيل. **المنهجية:** أجريت دراسة الشاهد والحالة على المسنين في مستشفيات حكوميين و دار لرعاية المسنين في مدينة أربيل في إقليم كردستان العراق من الثامن من شهر آذار إلى الثالث من شهر آب 2016 والمتكونة من 100 مسن أعمارهم من 60 سنة فما فوق ومن كلا الجنسين، ولديهم وعي كامل ويشكون من وجود كسر في العظم الوركى (50 من مجموعة الحالة) و عدم كسر العظم الوركى (50 من مجموعة الشاهد). المعايير المطابقة هي العمر والجنس، والسقوط هو السبب في كسر العظم الوركى. تم إعداد الاستمارة الإستبائية كأداة لجمع المعلومات والمتكونة من جزأين أساسيين: المعلومات الديموغرافية والاجتماعية والمقاييس الأنثروبومترية مع مقاييس العوامل الخطورة لكسر العظم الوركى. وتم جمع البيانات من خلال المقابلة المباشرة. وقد تم تحليل النتائج باستخدام البرنامج الإحصائي (SPSS V.23) لتحليل البيانات واستخدمت الإحصاءات الوصفية والإستنتاجية الذي تتضمن التكرارات، النسب المئوية، نسبة الأرجحية، فاصل الثقة واختبار مربع كاي.

النتائج: أشارت نتائج الدراسة الحالية بأن غالبية عينة الدراسة من كلتا المجموعتين الحالة والشاهد هم لا يقرأون ولا يكتبون، ومتزوجين، يسكنون مع عائلاتهم، وهم من سكنة المدينة. وأشارت النتائج أيضا بوجود دلالة إحصائية مؤثرة بين مجموعتين الحالة والشاهد من حيث: هشاشة العظام والتهاب المفاصل، واضطراب النوم، استخدام الأدوية المنومة والمسكنات، مزيل القلق، مكافحة الاكتئاب، الأدوية الخافضة للضغط، السكتة الدماغية، ارتفاع ضغط الدم، التهاب مفاصل الركبة، تاريخ حصول كسر في رأس عظم الفخذ، مؤشر كتلة الجسم، ضعف البصر، انخفاض الأطراف اختلال وظيفي، قيود وظيفية، قلة تناول الحليب والكالسيوم، قلة التعرض للشمس، التدخين، تناول السمك أقل من مرتين في الأسبوع، ممارسة الرياضة البدنية أقل من 4 مرات في الأسبوع. ونسبة الاحتمالات من كل عوامل الخطر المذكورة أعلاه بين المشاركين في الدراسة في كل من المجموعتين الحالة والشاهد تؤثر في زيادة المخاطر المرتبطة بكسر العظم الوركى بين المسنين حيث بدء من 11.385 إلى 2.447 عدد مرات الخطورة.

الاستنتاج: استنتجت الدراسة بأن أكثر عوامل الخطورة التي لها علاقة بحصول كسر العظم الوركى هو هشاشة العظام وقلة تناول الحليب والكالسيوم أقل من 1000 ملغ في الطعام يوميا. **التوصيات:** أوصت الدراسة بالوقاية من حصول كسر العظم الوركى في حياة البالغين في وقت مبكر، وبدءا من تقييم عوامل الخطورة والعمل للحد من حدوثها.

الكلمات الدالة: عوامل الخطورة، كسر العظم الوركى، البالغين المسنين، دراسة الشاهد والحالة، السقوط.

Abstract

Objective: The study aimed to find out the factors associated with hip fracture among elderly adults in Erbil City.

Methods: The present case-control study conducted among elderly participants in two governmental hospitals and Geriatric Home in Erbil City of Kurdistan Region of Iraq from 8th of March to 3rd of August 2016. The study participants included elderly with more than and equal to 60 years old, both genders, conscious, with hip fractured (50 for case group) and without hip fracture (50 for control group). The control was matched to cases in age, gender and falling cause of hip fracture. The Questioner was designed as a tool of data collection and consisted of two main parts, socio-demographic characteristics and anthropometric measurements and risk factors assessment of hip fracture. Data was collected through direct interview. The data was analyzed through using statistical application (SPSS V. 23) which included descriptive and inferential statistical analysis of frequency, percentage, odds ratio, confidence interval and Chi-square test.

Results: Most of the study sample in both case and control groups were illiterate, married, keeping house, from urban area. There is highly significant association between case-control groups regarding Osteoporosis, Arthritis, Sleep disturbance, Use of medication such as sedative-hypnotic, anxiolytic, anti-depressive, antihypertensive drugs, Stroke, Hypertension, knee osteoarthritis, history of hip fracture, Body Mass Index, Visual impairment, Lower limb dysfunction, Functional limitations, Low taking Milk and Calcium intake, low Sun exposure, Heavy Smoking, Eating fishless than twice a week, and Sports or physical exercise less than 4 times per a week. The Odds Ratio of all of above risk factors among study participants in both case and control groups is in increased associated risk with hip fracture among elderly adults starting from 11.385 to 2.447 times of risk.

Conclusions: The highest risk factors that associated with increasing occurrence of hip fracture are Osteoporosis and taking less than 1000 mg of milk and calcium in the food per day.

Recommendations: The study recommends beginning hip fracture prevention in early adult life, starting by assessing risk factors and working to keep them low.

Keywords: Risk factor, Hip fracture, Elderly adult, Case-Control study, fall.

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INTRODUCTION

A fall is usually defined as “an event which results in the person coming to rest inadvertently on the ground or other lower level, and other than as a consequence of the following: sustaining a violent blow, loss of consciousness, sudden onset of paralysis, or an epileptic seizure” ⁽¹⁾. A fall may be the first indicator of an acute problem such as infection, postural hypotension, or cardiac problems, may stem from a chronic disease such as parkinsonism, dementia, or diabetic neuropathy, or simply may be a marker for the progression of “normal” age-related changes in vision, gait, and strength. Most falls that are experienced by older persons have multifactorial and interacting predisposing and precipitating causes (eg, a trip over an electrical cord contributed to by a gait disorder and poor vision) ⁽²⁾. The National Health Interview Survey indicates that falls are the largest single cause of restricted activity days among older adults, accounting for 18% of restricted days. Moreover, fall-related injuries recently accounted for 6% of all medical expenditures for persons aged >65. Unintentional injuries are the fifth leading cause of death in older adults (after cardiovascular disease, cancer, stroke and pulmonary disorders), and falls constitute two-thirds of these deaths. It is estimated that 18–33% of hip fracture subjects will die within the first year and 50% of patients lose functional dependence ^(3,4). Hip fractures commonly result in permanent disability, admission to institutional care, or death, and are one of the most damaging fractures among elderly people. About 90% of hip fractures in elderly people result from a fall ⁽⁵⁾.

In fact, for every 10 hip fractures, about nine occur in people over the age of 60. Hip fractures double with every five-year increase in age after age 50. By 90 years of age, one in four women and one in eight men will have fractured a hip, according to a study done by the Center for Disease Control and Prevention ⁽⁶⁾. Hip fractures have been associated with increased mortality, and several risk factors are associated with elevated rates of this injury, although the risk factors for death after a hip fracture have been studied worldwide, this issue has scarcely been addressed in the world ⁽⁷⁾.

There are very little is known about the epidemiology of hip fractures in the Kurdistan region and what the most significant risk factors are. Preventing hip fracture is a public health priority in the Kurdish society given the ongoing transition to the super aging society. The risk for hip fractures can be reduced by preventing falls. It is therefore important to identify those individuals most at risk of falling in order to maximize the effectiveness of any proposed intervention. By understanding that risk factors which increase the likelihood an elderly person will fall, we can better target prevention programs to reduce the number of falls. For the above reasons the researcher intended to find out risk factors associated with hip fracture among elderly adults.

OBJECTIVE

The study aimed to find out the factors associated with hip fracture among elderly adults in Erbil City.

METHODOLOGY

Research design: A case-control study design.

Duration of the study: This study was carried out from 8th March to 3rd August 2016.

Setting: The study was conducted in Orthopedic Wards of two governmental hospitals (Hawler Teaching Hospital and West Emergency Hospital) and Erbil Geriatric Home in Erbil City of Kurdistan Region of Iraq

Study sample: The study participants eligible for being sample according to inclusion criteria that included 100 elderly people age more than and equal to 60 years old, both genders, conscious, with 50 hip fractured (for case group) and without 50 hip fracture (for control group). The control was matched to cases in age, gender and falling cause of hip fracture.

Tools and methods of data collection: The questioner was designed as a tool of data collection and consisted of two main parts, part one included socio-demographic characteristics of participants, part two was anthropometric measurements and risk factors assessment of hip fracture. Data was collected through direct interview (face to face).

Ethical considerations: The researcher was obtained permission from the Ethical Committee at the College of Nursing/Hawler Medical University. Before collecting the data, the official permission from the Directorate of Health (Erbil), Ministry of Labor and Social Affairs, the administrative of two Teaching Hospitals and Erbil Geriatric Home was obtained. The researcher promised to keep the participant's information confidential, and use these data for this study only then they explained the purpose of this study to each participant. In addition to above, the researcher told each participant that this is an involuntary work, and they can leave any time even the interview process is not completed.

Statistical analysis:

The data was analyzed through using statistical application (Statistical Package for Science Service-SPSS V.23) which included descriptive and inferential statistical analysis of frequency, percentage, odds ratio, confidence interval and Chi-square test.

RESULTS:

A total of 50 patients with hip fracture and 50 controls without hip fracture were enrolled in this study. The present study aimed to find out risk factors associated with hip fracture among elderly adults.

Table 1: Socio-demographic characteristics of 50 cases and 50 controls of study participants

Socio-demographic characteristics		Case		Control	
		F	%	F	%
Age group (years)	60-74	25	50	25	50
	75-89	25	50	25	50
Gender	Male	25	50	25	50
	Female	25	50	25	50
Education level	Illiterate	35	70	30	60
	Can read and write	5	10	6	12
	Primary school graduated	6	12	9	18
	Intermediate school graduated	4	8	5	10
Marital status	Single	2	4	0	0
	Married	40	80	44	88
	Widowed	8	16	6	12
Occupational status	Self-employed	4	8	6	12
	Keeping house/homemaker	38	76	33	66
	Retired	8	16	11	22
Residential area	Urban	45	90	39	78
	Rural	5	10	11	22

1. Socio-demographic characteristics of study participants

Control group matched with case group in age, gender and falling down cause of hip fracture. Table 1 shows the socio-demographic characteristics of the study sample. Most of the study sample in both case and control groups were illiterate (70% and 60% respectively), while the lowest percentage in intermediate school graduated (8% and 10% respectively). Regarding the marital status, the highest percentages of the participants were married (80% and 88% respectively), but the lowest percentage were single (2% and no single respectively). Concerning the occupational status, more than half of the study sample was keeping house/homemaker (76% and 66% respectively), while some of them were self-employed (8% and 12% respectively). Regarding the residential area, the highest percentages of the participants were from urban area (90% and 78% respectively).

Table 2: Medical conditions of 50 cases and 50 controls as a risk factor of hip fractures among study participants

Medical conditions as a risk factor of hip fractures	Case group				Control group				P-value	Risk estimation		
	Risk		Not risk		Risk		Not risk		Chi square	Odds	Confidence	Interval
	F	%	F	%	F	%	F	%	Test	Ratio	Lower	Upper
Osteoporosis	40	80	10	20	13	26	37	74	< 0.001 VHS	11.385	4.457	29.081
Arthritis	46	92	4	8	29	58	21	42	< 0.001 VHS	8.328	2.595	26.721
Sleep disturbance	43	86	7	14	22	44	28	56	< 0.001 VHS	7.818	2.950	20.720
Use of medication	22	44	28	56	5	10	45	90	< 0.001 VHS	7.071	2.402	20.814
Knee osteoarthritis	31	62	19	38	11	22	39	78	< 0.001 VHS	5.785	2.400	13.942
Cataract	13	26	37	74	3	6	47	94	0.006 HS	5.505	1.460	20.755
Hypertension	35	70	15	30	16	32	34	68	< 0.001 VHS	4.958	2.124	11.576
History of hip fracture	27	54	23	46	10	20	40	80	< 0.001 VHS	4.696	1.931	11.418
Parkinson's disease	17	34	33	66	5	10	45	90	0.004 HS	4.636	1.553	13.840
History of falls	31	62	19	38	20	40	30	60	0.028 S	2.447	1.095	5.468
Hormone therapy	37	74	13	26	35	70	15	30	0.656 NS	1.220	0.509	2.925
Dementia	20	40	30	60	18	36	32	64	0.680 NS	1.185	0.528	2.660
Epilepsy	0	0	50	100	0	0	50	100			Constant	

2. Medical conditions as a risk factor of hip fractures among study participants

Table 2 shows the medical problems of the study sample which are consider as a risk factors of hip fracture. Among case group the highest percentage of the case sample had Arthritis (92%) and the lowest percentage was Cataract (26%), while in control group 35% of them get Hormone therapy and Cataract was the lowest percentage (6%), but they did not had Epilepsy in both groups. There is a very highly significant association between case-control groups regarding Osteoporosis, Arthritis, Sleep disturbance, Use of medication such as sedative-hypnotic, anxiolytic, anti-depressive drugs, Hypertension, Knee osteoarthritis, and History of hip fracture (p-value < 0.001 for each of them), also there is a highly significant and significant association between case-control groups regarding Cataract, Parkinson's disease, and History of falls (p-value 0.006, 0.004, and 0.028 respectively). But there is a non- significant association between case-control groups regarding Hormone therapy, and Dementia (p-value 0.656, and 0.680 respectively). The Odds Ratio of medical problems among study participants in both case and control groups in increased associated risk with hip fracture started from Osteoporosis eleven times to History of falls two times as following: the medical conditions that have increased associated risk factor with hip fracture which are: Osteoporosis (OR: 11.385, CI: 4.457-29.081), Arthritis (OR: 8.328, CI: 2.595-26.721), Sleep disturbance (OR: 7.818, CI: 2.950-20.720), use of medication (OR: 7.071, CI: 2.402-20.814), Knee osteoarthritis (OR: 5.785, CI: 2.400-13.942), Cataract (OR: 5.505, CI: 1.460-20.755), Hypertension (OR: 4.598, CI: 2.124-11.576), History of hip fracture (OR: 4.696, CI:

1.931-11.418), Parkinson's disease (OR: 4.636, CI: 1.553-13.840), and History of falls (OR: 2.447, CI: 1.095-5.468) respectively. While there are medical conditions that considered no risk factor with hip fracture which are: Epilepsy (OR: 2.042, CI: 1.668-2.499), while the reduced associated risk with hip fracture was Hormone therapy (OR: 1.220, CI: 0.509-2.925), and Dementia (OR: 1.185, CI: 0.528-2.660). There is no sample with Epilepsy.

Table 3: Anthropometric measurements and Functional limitations of 50 cases and 50 controls as a risk factor of hip fractures among study participants

Anthropometric and Functional limitations as a risk factor of hip fractures	Case group				Control group				P-value	Risk estimation		
	Risk		Not risk		Risk		Not risk		Chi square	Odds Ratio	Confidence Interval	
									Test			
	F	%	F	%	F	%	F	%				
Body Mass Index	28	56	22	44	7	14	43	86	< 0.001 VHS	7.818	2.950	20.720
Visual impairment	41	82	9	18	20	40	30	60	< 0.001 VHS	6.833	2.732	17.093
Lower limb dysfunction	37	74	13	26	20	40	30	60	0.001 VHS	4.269	1.828	9.971
Functional limitations	35	70	15	30	20	40	30	60	0.003 VHS	3.500	1.529	8.012
Immobilization or bedridden	0	0	50	100	0	0	50	100			Constant	

3. Anthropometric measurements and Functional limitations as a risk factor of hip fractures among study participants

Table 3 shows the anthropometric measurements and functional limitations as a risk factor of hip fractures. In case group 41% of the case sample had Visual impairment, but 28% of them had overweight or obese Body Mass Index. While in control group all of them had 20% visual impairment, 20% lower limb dysfunction, 20% functional limitations, but 7% of them had overweight or obese Body Mass Index. There is no participants with immobilization or bedridden. There is a very highly significant association between case-control groups regarding items of Body Mass Index, visual impairment, lower limb dysfunction, and functional limitations(p-value < 0.001, < 0.001, 0.001, and 0.003 respectively). The Odds ratio of anthropometric measurements and functional limitations among study participants in both case and control groups is in increased associated risk with hip fracture for all items which are: in Body Mass Index overweight and obese considered as risk factor of hip fracture(OR: 7.818, CI: 2.950-20.720), visual impairment (OR: 6.833, CI: 2.732-17.093), Lower limb dysfunction (OR: 4.269, CI: 1.828-9.971),and functional limitations (OR: 3.500, CI: 1.529-8.012).There is no sample with immobilization or bedridden.

Table 4: Lifestyle conditions of 50 cases and 50 controls as a risk factor of hip fractures among study participants

among study participants													
Lifestyle conditions as a risk factor of hip fractures		Case group				Control group				P-value	Risk estimation		
		Risk		Not risk		Risk		Not risk		Chi square	Odds Ratio	Confidence Interval	
		F	%	F	%	F	%	F	%	Test	Lower	Upper	
Milk and Calcium intake	34	68	16	32	8	16	42	84	< 0.001 VHS	11.156	4.265	29.184	
Sun exposure	35	70	15	30	10	20	40	80	< 0.001 VHS	9.333	3.720	23.415	
Heavy smoking or pipe	41	82	9	18	23	46	27	54	< 0.001 VHS	5.348	2.151	13.298	
Eating fish	32	64	18	36	15	30	35	70	0.001 VHS	4.148	1.798	9.573	
Sports or physical exercise	29	58	21	42	14	28	36	72	0.002 VHS	3.551	1.541	8.181	
Alcohol intake	0	0	50	100	0	0	50	100				Constant	

4. Lifestyle conditions as a risk factor of hip fractures among study participants

In table 4 the findings of the current study regarding the lifestyle conditions shows that the Heavy cigarette smoking or pipe had a highest percentage among all case-control participants (41%, 23% respectively), but the lowest percentage among cases is not doing Sports or physical exercise 4 times per a week (29%) and taking lower than 1000 mg of Milk and Calcium in their food per a day (8%) in control group. There is a very highly significant association between case-control groups regarding all items of Milk and Calcium intake, Sun exposure, Heavy Smoking, Eating fish twice a week, and Sports or physical exercise 4 times per a week (p-value < 0.001, < 0.001, < 0.001, 0.001, and 0.002 respectively). The Odds Ratio of Lifestyle conditions among study participants in both case and control groups is in increased associated risk with hip fracture for all items which are: Milk intake never or sometimes and Calcium intake lower than 1000 mg per day (OR: 11.156, CI: 4.269-29.184), Sun exposure in never or seldom (OR: 9.333, CI: 3.720-23.415), Heavy smoking cigarette or pipe in often or very often (OR: 5.348, CI: 2.151-13.298), Eating fish less than twice per week (OR: 4.148, CI: 1.798-9.573), and Sports or physical exercise doing never or less than 4 times per a week (OR: 3.551, CI: 1.541-8.181). Alcohol intake is constant in this study because all participants are not drinker.

DISCUSSION

Regarding the socio-demographic characteristics of the study sample, most of them in both case and control groups were illiterate, married, keeping house/homemaker, from urban area. The findings of the current study agreed with the study which was done by Coutinho et al. in Rio de Janeiro-Brazil under the title Risk factors for falls with severe fracture in elderly people living in a middle-income country, who found that most of the study sample were between 60-90 years old, married, with none and elementary incomplete elementary, un working before the fall from urban area ⁽⁸⁾.

There are many medical conditions that considered as a risk factor of hip fracture among elderly adults, most of these medical problems have an increased associated risk factor with hip fracture which are: Osteoporosis, Arthritis, Sleep disturbance, use of medication such as sedative-hypnotic, anxiolytic, anti-depressive, antihypertensive drugs, Knee osteoarthritis, Cataract, Hypertension, history of hip fracture, Parkinson's disease, and History of falls respectively. Most of the mentioned results about the medical problems in this study supported by the study which was done in Japan by Suzuki et al. who found that these certain medical disorders or illness were associated with increasing risk factors of hip fracture among elderly person and also agreed with the study which was done in South Brazil by Ribeiro et al. in 2014, the Bulletin 76 of Australia n Institute of Health and Welfare in 2010 by Australia n Government ; all of the above studies mentioned that the described medical problems had an increased associated risk factor with hip fracture among elderly adults with adjusting age and gender ^(9, 10, 11, 12).

Concerning the anthropometric measurements and functional limitations as a risk factor of hip fractures, all of the items have increased associated risk factors with hip fracture as following: in Body Mass Index overweight and obese considered as risk factor of hip fracture, Visual impairment, Lower limb dysfunction, and Functional limitations. All of above this study results are agreed with the study done by Dargent-Molina et al. in five French areas: Amiens, Lyon, Montpellier, Paris, and Toulouse, the study done in Lebanon under the title Hip Fractures in Lebanese Patients by Hreybe et al. and with the study done by Rubenstein in 2006 in UCLA School of Medicine and Geriatric Research Education and Clinical Center (GRECC), VA Medical Center, Sepulveda, in USA under the title Falls in older people: epidemiology, risk factors and strategies for prevention; they found that the mentioned items of anthropometric measurements and

functional limitations have increased risk factor of hip fractures among elderly people. Immobilization or bedridden had no associated risk factor with hip fracture, this finding supported by a study which was done by Suzuki et al. in Japan, who revealed that bedridden remained as significant independent variables for reduction of the risk of hip fracture (13, 14, 3, 9).

Regarding the lifestyle of the participants in the present study, Milk intake never or sometimes and Calcium intake lower than 1000 mg per day, Sun exposure in never or seldom, Heavy smoking cigarette or pipe in often or very often, Eating fish less than twice per week, and Sports or physical exercise doing never or less than 4 times per a week have increased associated risk with hip fracture. The results of the current study were agreed with the study which found that Fish consumption is a major source of calcium (especially minced fish including bones), fish are rich in eicosapentaenoic acid (EPA: 20:5, omega-3) and docosahexaenoic acid (DHA:22:6 omega-3) in particular, dark-meat fish such as mackerel and sardine, contain about 2.5 g EPA and DHA per 100 g. they possess the ability to decrease prostaglandin E 2 (PGE~) and interleukin-1 (IL-I) in serum, both of which have the function of bone absorption in vitro. In this context, a high omega-3 acid (EPA and DHA) intake via the consumption of dark-meat fish for many years may have a preventative effect for fractures by influencing bone metabolism; and the present results also supported by the study which was done by Yamashita¹ and Bailer under the title Risk Factors for Hip Fracture in Japanese Older Adults in 2012; furthermore it agreed with the study done by Suzuki et al. found that the role of heavy smoking as a risk factor for hip fracture seems to be controversial. Some studies suggest that both ex- and current smokers have a greater risk of hip fracture than those who do not smoke (9, 15).

CONCLUSIONS

Osteoporosis and taking lower than 1000 mg of Milk and Calcium in the food per day was the main risk factors for hip fracture among elderly persons.

RECOMMENDATIONS

Preparation an educational programs for all elderly patients who admitting hospitals and have medical problems that are increased the risk with hip fracture, to increase level of knowledge regarding risk factors and how to prevent it through providing adequate information regarding control methods of modifiable risk factors that leads to hip fracture.

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