

# Epidemiology of Orthopedic Trauma in The Geriatric Population of Karachi, Pakistan

Mansoor Kanaan<sup>1</sup>, Saba Shahnawaz<sup>2</sup>, Ranjeet Kumar<sup>3</sup>, Ali Ahmad<sup>3</sup>, Anisuddin Bhatti<sup>3</sup>

## ABSTRACT

**Objective:** To study the etiology, various mechanisms of injury and outcome of orthopedic trauma in elderly patients presenting to the Emergency Department of a tertiary care hospital.

**Methods:** The data was prospectively collected over a period of 1 year (Jan 2015-Dec 2015) at the Jinnah Postgraduate Medical Centre's orthopaedic bay in the Emergency Department. 692 elderly trauma-patients above 65 years were included. The doctors on duty filled out a simple questionnaire for every patient that presented with orthopedic injury. Statistical analysis was done using SPSS version 20.

**Results:** Falls on the same plane were the most common cause of injury at 67.1% (n=464), while road traffic accidents were the second most common accounting for 22.55% (n= 156), and alarmingly third came gunshot injuries at 2.3 % ( n=16). The most common site of injury due to falls was the lower limb at 43.9% (n=304) while the upper limb was 23.1% (n =160). Of the fall injuries, 81.9% (n=464) had a fall on the same plane while 18.1% (n=84) had a fall from 10 feet or higher.

**Conclusion:** The percentage of elderly patients amongst the general population is increasing day by day and so is the risk for trauma. Aggressive management to counteract this increase in geriatric trauma is required, along with sensitivity to issues such as elder abuse. An emphasis on nationwide policies and state run programs for elder citizens regarding healthcare and primary disease prevention as well as their rehabilitation will serve to reduce the burden on an already poverty stricken nation.

## INTRODUCTION

Pakistan is a developing nation with limited resources at hand and an ever-expanding population, due to which there is a scarcity of proper medical management. Orthopedic injuries in Pakistan are as common as in any other part of the world. The burden of orthopedic injuries is prevalent in all age groups of the population but the geriatric age group has been claimed to have a poor outcome regarding traumatic injuries. This is postulated to be due to a decrease in physiological reserve and an increase in the number of co-morbid factors [1,2].

Ranging from adolescents to adults, a large portion of trauma patients can be attributed to the aforementioned age groups, but the fastest growing age band for trauma centers is patients above the age

of 65 years [3]. A Census done in the United States in 2010 stated that there were roughly 40.3 million people aged 65 years or older comprising 13 percent of the total population as compared to an older census in 2000 which showed 35 million people in this age bracket, amounting to 12.4 percent of the total population [4]. Trauma is considered to be the fifth leading cause of death and it is approximated that roughly 1/3 of the health care resources are spent on patients above 65 years of age [4-7]. The National Trauma Database of the United States highlighted that elderly patients comprised 25 % of the patients presenting to trauma centers in the United States during 1990 [8]. A major etiology of orthopedic trauma is shown to be injuries related to falls in the elderly while in young patients the major cause of injuries was due to penetrating injuries and road traffic accidents or motor vehicle accidents [9-10]. The global burden of injuries is already substantial and in the years to come, the leading cause of death and disabilities would be injuries [11]. A major chunk of this burden would be borne by countries, which have a high population of low or middle-income people [12], and thus Pakistan is amongst the front-runners of such nations. In the

<sup>1</sup>Emergency Department, Dr. Ziauddin University Hospital, Karachi, Pakistan

<sup>2</sup>Dialysis Unit, The Kidney Centre, Karachi, Pakistan

<sup>3</sup>Orthopaedics Department, Jinnah Postgraduate Medical Centre, Karachi, Pakistan.

Correspondence: Kanaan Mansoor

E-mail: kanaanm@gmail.com

census of 1998 there were 7.3 million elderly persons which was 5.6% of the total population, and this population of elderly persons is expected to rise to as high as 26.84 million, or 11% of the total population of Pakistan soon [13]. This shows that healthcare and rehabilitation issues regarding senior citizens will be on the rise in the future and appropriate measures should be taken to combat them, as this is one section of the population which usually does not contribute to the economy and therefore a rise in their issues means an increased burden on the country.

Pakistan is a developing nation with high crime rates, a negligible following of traffic laws and poor health care. This study was done in the most populated city of Pakistan, Karachi, to study the pattern of injuries amongst the geriatric population of the study. Jinnah Post Graduate Medical Center is the busiest tertiary care hospital in the city and has one of the highest inflows of patients in the city.

## METHODS

This was a cross sectional study conducted at, Karachi, Pakistan. The survey included analysis of all injured patients greater than 65 years of age who presented at the orthopaedic unit of the Accident and Emergency Department for a period of 1 year starting from January 2015. Ethical committee of the hospital approved the study protocol before initiation. Informed consent was obtained from all patients. The doctors on duty filled out a questionnaire for every geriatric patient that presented with an orthopedic injury. The information recorded included the victim's age, gender, date, nature of injury, place of injury, cause of injury, approximate time of injury, mode of treatment, time of treatment and outcome. The total sample size was 692 that were collected over the period of a year. Statistical analysis was done using SPSS version 20.

## RESULTS

A total of 692 patients above the age of 65 presented to the ER during the time frame of the study. The most common cause of injury was noted to be a fall which accounted for 67.1% (n=464), while road traffic accidents were the second most common cause of injury which accounted for 22.5% (n= 156) and the third most common cause and the most alarming finding was orthopedic trauma due to gunshot injuries which accounted for 2.3 % ( n=16). The most common site of injury in the case of a fall was the lower limb,

accounting for 43.9% (n=304) while upper limb injuries due to fall came to 23.1% (n =160).

**Table 1:** Cause of trauma

|                        | Frequency (n) | Percent % |
|------------------------|---------------|-----------|
| RTA-Pedestrian         | 116           | 16.8      |
| RTA- Bike              | 38            | 5.5       |
| RTA- Car               | 20            | 2.9       |
| RTA- commercial        | 2             | .3        |
| Fall-same level        | 380           | 54.9      |
| Fall- height           | 84            | 12.1      |
| Gun shot               | 16            | 2.3       |
| Assault- blunt         | 4             | .6        |
| Assault -penetrating   | 4             | .6        |
| Occupational – machine | 2             | .3        |
| Sports                 | 2             | .3        |
| Other                  | 24            | 3.5       |
| Total                  | 692           | 100.0     |

As highlighted in Table 1, author divided fall related injuries into two different categories, which included fall from the same plane and fall from a height of more than 10 feet. Out of the 464 patients who presented with fall related injuries, 81.9% (n=464) had a fall on the same plane level while 18.1% (n=84) had a fall from 10 feet or more.

**Table 2:** Severity of Injuries in Patients with Fall

|                        | Frequency | Percent |
|------------------------|-----------|---------|
| Fracture of upper limb | 128       | 27.6    |
| Fracture of lower limb | 264       | 56.9    |
| Fracture of pelvis     | 14        | 3.0     |
| Fracture of clavicle   | 8         | 1.7     |
| STI upper limb         | 10        | 2.2     |
| STI lower limb         | 24        | 5.2     |
| Dislocation upper limb | 14        | 3.0     |
| Dislocation lower limb | 2         | .4      |
| Total                  | 464       | 100.0   |

Patients who had a fall on the same plane were mostly women 54%(n=208) while men constituted 45.2% ( n=172) , and these falls mostly occurred at home. Our data has included the sub categories of patient presentation, time and the time of injury. Patients who had an injury due to a fall and presented on the same day were 59.1% of the total (n=274) out of which 63.5% (n=174) had a fall during the day while 36%(n=100) had a fall at night. Another aspect that is interesting is that 40% (n=190) out of the 464 patients,

who had a fall, had their medical management delayed by their caretakers

Patients, who had a fall, had different degrees of injury, ranging from fractures to dislocations and soft tissue injuries, as shown in Table 2.

Patients with upper limb fractures had 8.4%(n=58) combined Radius and Ulna fractures while isolated fractures of the Radius were 4.6% (n=32), Humerus were 3.75% (n=26) and Ulna were 0.3%(2). Patients with lower limb fractures had 24.3% (n= 168) neck of femur fractures, 6.9% (n=48) shaft of femur fractures and combined fractures of the Tibia and Fibula accounted for 2.3% (n =16). Isolated fractures of the Tibia were (8), Fibula were (4) and patellar fractures were (4). Out of the patients with fractures of the upper limb, 4 were admitted, while 134 patients with lower limb fractures were admitted and 8 were

referred. Rest of the patients were managed conservatively and asked to follow up in the OPD.

The second most common cause of injury was shown to be road traffic accidents, which we divided into four categories; (1) patients who were pedestrians, (2) patients who were in a car, (3) a commercial vehicle or (4) whether the patient was riding a bike. Out of the total sample size of 692, the percentage of road traffic accidents involving elderly patients was 25.4% (n=176). Majority of the patients involved in RTAs were males 20.2% (140) while females constituted 5.2% (n=36). Most of the patients were pedestrians, accounting for 16.7% (n=116), patients riding bikes were 5.49 % (n=38), patients were either passengers or driving the cars were 2.9% (n=20) while patients who were either passengers or drivers of commercial vehicles were .3% (n=2).

**Table 3:** Most common site of injury according to the type of RTA

|   | Cause of trauma |           |          |                 | Total |
|---|-----------------|-----------|----------|-----------------|-------|
|   | RTA-Pedestrian  | RTA- Bike | RTA- Car | RTA- commercial |       |
| Fracture of upper limb                                    | 28              | 12        | 4        | 0               | 44    |
| Fracture of lower limb                                    | 72              | 14        | 8        | 2               | 96    |
| Fracture of pelvis  | 0               | 2         | 0        | 0               | 2     |
| Fracture of clavicle                                      | 2               | 2         | 2        | 0               | 6     |
| STI upper limb  | 4               | 2         | 6        | 0               | 12    |
| STI lower limb  | 6               | 2         | 0        | 0               | 8     |
| Dislocation upper limb                                    | 0               | 2         | 0        | 0               | 2     |
| Dislocation lower limb                                    | 0               | 2         | 0        | 0               | 2     |
| Diabetic limb/ gangrene                                   | 2               | 0         | 0        | 0               | 2     |
| Infection, wound, cut, vascular, amputation, foreign body | 2               | 0         | 0        | 0               | 2     |
|   | 116             | 38        | 20       | 2               | 176   |

The most common bone affected in pedestrians was the combined fracture of Tibia and Fibula which accounted for 3.5%(n=24) while the second most fractured region was the neck of femur 2.3%(n=16), followed by the shaft of femur 1.4%(n=10). The most common bone affected in patients involved in RTA-Bike was the combined fracture of Radius Ulna which accounted for (n=12) while the second most fractured bones were Tibia and Fibula combined (n=6), followed by the Humerus (n=4). Patients involved in RTA Car sustained fractures to the Humerus (n=4), followed by fractures of the Tibia and Fibula combined (n=6). Commercial RTAs rarely occur and if so, the passenger and drivers are mostly safe thus there were only two

fractures in that category, which were of the neck of femur.

The third most common cause of fractures was Fire Arm injuries. The group of people that presented with fire arm injury and fractures were 2.3% (n=16) and the most common site of injury was the upper limb at 1.2% ( n=8) followed by the lower limb at 1.2%(n=8). The most common bones to be fractured were the Humerus, Radius, Metacarpals and Scapula which were evenly divided leading to 2 of each. The lower limb had four fractures, which evenly divided into 2 fractures in each category: the Fibula and the ankle joint. Majority of the gunshot victims were males 1.7%(12) while there were only 0.6%(n=4) females.

## DISCUSSION

The elderly population is slowly rising due to advancements in the health sector. This population is at a higher risk of orthopedic injuries due to the increased number of co-morbidities [14]. The most reliable assessment of global mortality and morbidity is provided by the Global Burden of Disease project [15] and the first ever Global Burden of Disease study was conducted in 1991 and published in 1996 [11]. This study introduced DALY (disability-adjusted life year), which drew attention to non-fatal outcomes of diseases that prevail in the society and impact the overall health status of a population. Unintentional injuries accounted for 66% of injury related deaths and 70% of injury related DALYs in 2001 [16].

Amongst 692 patients, the three most common causes of injury were noted to be a fall (67.1%), road traffic accidents (22.5%) and most alarmingly, orthopedic trauma due to gunshot injuries (2.3%), respectively. These results, except for the gunshot injuries, were similar to a study conducted at an urban university hospital in the United States published in 2000 [17], and the results demonstrated previously in Ontario, Canada, published in 2006 [17]. Another set of results from 1999 showed that elderly patients are more likely to be injured by falls [18].

In 2013 it was shown in Karachi, Pakistan that 59% of the elderly who had a fall sustained an injury to their lower limb and that a majority of the elderly who had a fall was because of tripping or slipping on the same plane as opposed to falling from a height and this fact is reinforced in our study [14]. Out of the 464 patients who presented with fall related injuries, 81.9% (n=464) had a fall from the same plane level while 18.1% (n=84) had a fall from 10 feet or more, similar to what was deduced previously in the city of Rahim Yar Khan, Pakistan in 2011 [19].

Patients who had a fall on the same plane were mostly women 54%(n=208) while men constituted 45.2% (n=172), and these falls mostly occurred at home, which was in accordance with a study done by the British Geriatric Society and other studies [20-24]. The British Geriatric Society's research also stated that a majority of the falls happened during the day, which is also evident in our data. Another aspect that is interesting is that 40% (n=190) out of the 464 patients, who had a fall, had their medical management delayed by their caretakers, which begs to take elderly abuse in to account. This is an issue which has not been paid much heed in a society like Pakistan where religious

beliefs already emphasize on the respect and care of parents and elderly people.

The second most common cause of injury was shown to be road traffic accidents, corroborated by a study from 2012, showing that elderly patients were at an increased risk of RTAs and they respond poorly to the sustained injuries [25]. Elderly patients tend to sustain different types of injuries when compared to younger patients and have a mortality of more than 50% above that of the general population [26-28]. Aggressive management is the most important aspect in treating elderly patients involved in RTAs as it leads to a better outcome [29].

We divided road traffic accidents into four categories; patients who were pedestrians, patients who were in a car, a commercial vehicle or whether the patient was riding a bike. Out of the total sample size of 692, The percentage of road traffic accidents involving elderly patients was 25.4% and a majority of the patients involved in RTAs were males, similar to the results previously obtained in 2011 [19] and a study done in the UAE in 2008 [30]. These findings are in accordance with those procured in 2005 which state that the difference between the proportions of males to females in a country like Pakistan is owing to the fact that men spend a lot more time in motor vehicles as compared to women and men are more likely to be employed as drivers [31]. Most common bone affected in pedestrians was the combined fracture of Tibia and Fibula followed by the neck and shaft of femur respectively. This shows that pedestrians were mostly exposed to bumper fracture injuries.

The third most common cause of fractures was Fire Arm injuries, highlighting an increase in street violence in Pakistan and specifically in Karachi; there is an increased incidence of firearm injuries amongst all age groups. More than 25000 people die with gunshot injuries in the USA alone. Pakistan has a high number of firearm injuries because of the manufacturing of weapons in tribal areas and its shared border with Afghanistan [32]. In 2011 Lustenberger concluded that firearm injuries are not uncommon and are primarily self-inflicted and the site of injury is usually the head [33], but as religious beliefs in Pakistan are primarily against suicide, this is not seen often. The group of people that presented with fire arm injury and fractures were 2.3% (n=16) and the most common site of injury was the upper limb at 1.2% ( n=8) followed by the lower limb at 1.2%(n=8). The most common bones to be fractured were the Humerus, Radius, Metacarpals

and Scapula, which was evenly, divided leading to 2 of each. The lower limb had four fractures, which evenly divided 2 fractures in each category: the Fibula and the ankle joint. This shows that most of the injuries inflicted on the upper limb were because of self-defense while the lower limb is the common site for ricochet bullets. Majority of the gunshot victims were males 1.7%(12) while there were only 0.6%(n=4) females.

Cases presenting with a gangrenous limb or an infection leading to amputation constituted a miniscule yet important chunk of the total. In previous studies, although trauma (most commonly due to RTA) ranked second as the cause for limb amputations [34], it was found to be the most common indication for amputation in young adults. Occupational and Sports related injuries do not make a substantial contribution the geriatric age group as most elders do not partake in sports or occupational machinery work in our society.

## CONCLUSION

The percentage of elderly patients amongst the general population is increasing yearly and owing to their decreased physiological reserve and lack of adaptation to trauma, they are at a higher risk of traumatic injuries. These patients require aggressive management with a multidisciplinary approach that encompasses not only general medical principles but also keeps possibilities such as abuse in mind. In our country, due to the lack of government aid for senior citizens, most elders are financially dependent upon their caregivers, which have a higher possibility of negligence leading to malnutrition and thus an increased risk of fractures due to nutritional deficiencies. Further detailed studies are required to visualize the nutritional as well as other pertinent aspects of trauma amongst this age group and an emphasis on Geriatric care policies in the country is the need of the hour. A network of government employed Social workers should be deployed to ensure regular follow ups at the workplaces/ residences of elder citizens who are suspected to be facing abuse and neglect and nationwide campaigns focusing on diet and nutrition with regard to senior citizens should be launched. An emphasis on nationwide policies and state run programs for elder citizens regarding healthcare and primary disease prevention as well as their rehabilitation will serve to reduce the burden on an already poverty stricken nation.

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