

Epidemiology of Injuries in Kashmir - A Population based Cross Sectional Study

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Abstract

Background: More than 5 million people die each year as a result of injuries. This accounts for 9% of the world's deaths, nearly 1.7 times the number of fatalities that result from HIV/AIDS, tuberculosis and malaria combined. Despite growing awareness of the magnitude of the problem, attention to injury and violence prevention and control among policy-makers and those funding global public health programming remains disproportionately low. This kind of study was conducted first time in Indian side of Kashmir. Even the World Health Organization has no data on prevalence of injuries in Jammu & Kashmir. **Aims & Objectives:** 1. To determine the prevalence of injuries among Kashmiri population in district Srinagar. 2. To find out the pattern of injuries in the study population. 3. To identify various risk factors associated with injuries. **Methods:** 655 participants were interviewed in this Community based cross sectional study conducted in Srinagar-the capital city of Jammu & Kashmir state from 1st April 2015- 30th September 2016 using a two stage cluster random sampling method. **Results:** 19.7% of participants suffered from injuries in the past 1 year. Among the injured 29% suffered from major injuries and 71% from minor injuries. Majority (82.3%) of the injuries were unintentional. Depending on the mechanism of injuries-the most common type were Road traffic accidents (20.9%) followed by Falls (17.8%) and stuck/hit by an object or person (17.8%) and violence (12.9%). The most common place where injuries occurred were at home (46.51%). 15% of injured suffered from a disability. Not a single victim commuted using an ambulance to the hospital from the site of injury. **Conclusion:** Considerable proportion of those injured, were disabled temporarily for some time which affected their productivity and also became a socioeconomic burden on the society as a whole.

Keywords: Epidemiology; Injury compensation; Population based study; Cross-sectional; Srinagar; Kashmir

Introduction

Injuries have traditionally been regarded as random, unavoidable "accidents". Within the last few decades, however, a better understanding of the nature of injuries has changed these old attitudes, and today both unintentional and intentional injuries are viewed as largely preventable events. As a result of this shift in perception, injuries and their health implications have demanded the attention of decision-makers worldwide and injury policy has been firmly placed in the public health arena. Furthermore, the growing acceptance of injuries as a preventable public health problem over the past decade or so has led to the development of preventative strategies and, consequently, a decrease in the human death toll due to injuries in some countries. Based on the premise that access to accurate, reliable information is the key to sound policy-making, this publication seeks to provide an overview of the nature and extent of injury mortality and morbidity in the form of user-friendly tables and charts. It is hoped that the graphical representation of the main patterns of the burden of disease due to injury will raise awareness of the importance of injuries as a public health issue and facilitate the implementation of effective prevention programmes.^[1] India is passing through a major socio demographic, epidemiological, and technological and media transition. The political, economic and social changes have altered the health scenario. In the past two decades, India has witnessed rapid urbanization, motorization, industrialization and migration of people resulting from socioeconomic growth and development. With mechanization and revolution in technology, traditional ways of living and working are being altered. Injuries are a

major public health problem in India. Lack of reliable and good quality national or regional data has thwarted their recognition. Many injuries are linked to social, environmental, cultural and biological issues in causation; recognized as man-made and behavior linked disorders and linked to socio demographic transition. Prevention, acute and long-term care, and rehabilitation are the major challenges faced today.^[2]

More than 5 million people die each year as a result of injuries. This accounts for 9% of the world's deaths, nearly 1.7 times the number of fatalities that result from HIV/AIDS, tuberculosis and malaria combined. Approximately a quarter of the 5 million deaths from injuries are the result of suicide and homicide, while road traffic injuries account for nearly another quarter. Other main causes of death from injuries are falls, drowning, burns, poisoning and war. Injuries are an important public health concern, and remain a growing problem in some countries. Two of the three leading causes of injury deaths – road traffic injuries and falls – are predicted to rise in rank compared to other causes of death. Road traffic injuries are predicted to become

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the 7th leading cause of death by 2030, with falls rising to become the 17th leading cause of death and suicide remaining in the top 20. Tens of millions of people suffer injuries that lead to hospitalization, emergency department or general practitioner treatment, or treatment that does not involve formal medical care.^[3]

Injuries and violence impose heavy costs on individuals and on society as well as the huge emotional toll that injuries and violence exact on those affected, they also cause considerable economic losses to victims, their families, and nations as a whole. There are few global estimates of the costs of injury, but the following examples illustrate the financial impact of injuries on national economies and individual families: Road traffic deaths and injuries cost approximately 2% of gross domestic product in high-income countries and as much as 5% of gross domestic product in some low- and middle-income countries. These costs include medical bills, vehicle damage, and lost productivity and total around US\$ 1.9 trillion a year globally. Estimates on the economic costs of homicide and suicide showed that these were equivalent to 1.2% of gross domestic product in Brazil, 4% of gross domestic product in Jamaica, and 0.4% of gross domestic product in Thailand.^[3]

Injury and violence prevention is possible

Despite growing awareness of the magnitude of the problem, attention to injury and violence prevention and control among policy-makers and those funding global public health programming remains disproportionately low. Deaths from many communicable diseases are declining more rapidly than injury and violence-related deaths. This is particularly alarming given that many injuries and much violence can be prevented: there is a broad range of strategies based on sound scientific evidence that have been shown to be effective at reducing injuries and violence, and these strategies need to be more widely implemented. In recent decades the most significant declines in injuries have been seen mainly in high-income countries, which have reduced the burden of injury considerably by applying proven prevention and treatment strategies. For example, Sweden has successfully decreased the rate of child injuries over the past few decades by about 80% among boys and about 75% among girls. However, despite the fact that progress has been made, all countries must increase their investment in injury prevention. For example, while several countries have reduced their road traffic fatality rates in recent decades, in some the downward trend in road traffic fatalities that began in the 1970s and 1980s has started to plateau, suggesting that extra steps are now needed to reduce these rates further.^[3]

Rationale of study

Worldwide, injuries and violence are ranked among the leading causes of death and disability. This is particularly true in the case of the low-income and middle-income countries where injuries and violence are growing in significance, largely as a consequence of the epidemiologic, demographic and socioeconomic transitions that have characterized the development of these countries in recent decades.^[4] However, it is in these very settings that vital statistics and routine health information are most likely to be lacking or, at best, patchy. Furthermore, in many low-income and middle-income countries demographic data are often incomplete or out of date. This situation is sometimes compounded by the effects of large population displacements caused by conflict. For these reasons, current estimates of the burden of injuries and violence in low-income and middle-income countries are often based on projections from countries with more comprehensive injury data or on projections from population laboratories.^[5] Injuries are the one of the most important causes of morbidity & account for 9% of global mortality but no study has been done in the state of Jammu & Kashmir so far to find out the burden, its pattern and association with various risk factors. This study was conducted first time in district Srinagar. The study helped us to estimate the burden and pattern of injuries

along with its association with various risk factors among Kashmiris and thus help in policy making regarding prevention of injuries and necessary intervention. The study also adds information to the World Health Organization since there is no data available about injuries in Kashmir to WHO.

Aims and objectives

- To determine the prevalence of injuries among Kashmiri population in district Srinagar.
- To find out the pattern of injuries in the study population.
- To identify various risk factors associated with injuries.

Materials and Methods

It was a community based cross sectional study conducted from April 2015- September 2016 in District Srinagar- the summer capital city of Jammu and Kashmir state. Srinagar is situated in the Kashmir valley on the banks of river Jhelum, a tributary to Indus. Srinagar district has a population of 12,36,829 with total number of 1,91,678 households consisting of 90 wards allocated by Census department on the basis of population distribution. Out of 90 wards 79 are urban and 11 are rural which in fact one of the strengths of the study was where in an urban as well rural population was catered. People of all ages and both sexes who were permanent resident of Kashmir residing in district Srinagar for more than 1 year were included. On residents of Kashmir, people who suffered from disabilities due to other morbidities were excluded from the study.

A standard formula was used for calculating the appropriate sample size for a household.^[5] Therefore, the sample size calculated using the above formula was 126 households with each household having an average size of 6 as per Jammu Kashmir Population Census 2011. Two-stage cluster random sampling design was used for sampling. Srinagar comprises of 90 wards based on population distribution, out of which we took only 83 wards for sampling as the 7 wards which fall under high security zone are inaccessible due to security reasons and therefore excluded. The population of district Srinagar is 12,36,829 as per census survey report of December 2011 with 1,91,678 number of households. The sampling was done in two stages: In the first stage, we selected 30 wards by using probability proportionate to size sampling (PPS) method. In the second stage, households were selected by using systematic random sampling. We started the survey by selecting a random house as a starting point for the study from each selected ward and then from there moved in a predetermined random direction and took four houses randomly in order to achieve the cluster size. In case the house was locked I moved to the adjacent house. In the last 5 clusters I took 5 households instead of 4 in order to achieve the appropriate sample size. In case of refusal I again moved to the adjacent house. After introducing myself, the person in the household was explained the objectives of the study. A proper written informed consent was taken from all those people in a household who agreed to participate in the study. I made at least 3 visits to the household in order to interview the victim in person, even after that if the victim was not available for interview I interviewed the proxy candidate. In case the victim was less than 12 years, consent was taken from the parent or immediate care taker. For children less than 9 years of age, any one parent was interviewed. If the parent was not available, immediate care taker was interviewed.

Then relevant information about the below mentioned factors was taken: Socio demographic variables (e.g., age, gender, religion, education & occupation); Job characteristics (e.g. work hours); Vehicle ownership, Injury event factors (place, activity, date, time, intent, mechanism, nature, region, alcohol use), Injury Related disability-

subjective, Medical care (Sought, Place of medical care), Post injury impact (effect on usual activities, return to normal activity), Injury related death (Place, time of death), Specific Injury related risk factors (Road traffic accidents, Violence, Suicidal behavior, Poisoning, Fall, Burns, Drowning/near drowning, Object related injuries, electrical energy exposure, Animal related injuries), Injury related disability-objective (transfer ability, mobility), Management of injury (at the scene, at hospital). A semi structured pretested questionnaire was administered to obtain relevant information about demography, socioeconomic status, workplace, job characteristics, injury and its types along with the medical care sought. The term "injury" was defined as any physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy. It can be a bodily lesion resulting from acute exposure to energy in amounts that exceed the threshold of physiological tolerance, or it can be an impairment of function resulting from a lack of one or more vital elements (i.e., water, air, warmth), as in drowning, strangulation or freezing. The energy could be mechanical, thermal, chemical or radiant.^[5]

Major injury was defined as "Any injury that required hospitalization and altered the normal activity for one or more days or any injury related death with a longer recall period (i.e., of 12 months)", was used to obtain information on more severe, but less frequent injuries". In addition any fracture other than to fingers, thumbs or toes; amputation; dislocation of the shoulder, hip, knee or spine; loss of sight (temporary or permanent); chemical or hot metal burn to the eye or any penetrating injury to the eye; injury resulting from an electric shock or electrical burn leading to unconsciousness or requiring resuscitation or admittance to hospital for more than 24 hours; any other injury: leading to hypothermia, heat-induced illness or unconsciousness; or requiring resuscitation; or requiring admittance to hospital for more than 24 hours; unconsciousness caused by asphyxia or exposure to a harmful substance or biological agent; acute illness requiring medical treatment, or loss of consciousness arising from absorption of any substance by inhalation, ingestion or through the skin; acute illness requiring medical treatment where there is reason to believe that this resulted from exposure to a biological agent or its toxins or infected material.^[6] Minor injury was defined as "Any injury that may or may not require treatment by a healthcare provider, a hospital contact, with recall period of up to 3 months".^[7]

Risk Factors Which Were Included In the Study were a) Demographic factors (e.g., age, gender, religion, occupation, education); b) Socioeconomic status c) Injury event factors (place, activity, date, time, intent, mechanism, nature, region, alcohol use) d) Injury Related disability-subjective e) Medical care (Sought, place of medical care) f) Post injury impact (effect on usual activities, return to normal activity) g) Injury related death (Place, time of death) h) Injury related disability-objective (transfer ability, Mobility) i) Management of injury (at the scene, at hospital) j) Specific Injury related risk factors (Road traffic accidents, Violence, Suicidal behavior, Poisoning, Fall, Burns, Drowning/near drowning, Object related injuries, electrical energy exposure, Animal related injuries), Helmet, Seatbelt/ Child restraint, Firearm ownership & behavior (Whether carried in person or motor vehicle), Poisoning prevention behavior, Day/Time/ Seasonal variation of Injury, Influence of alcohol, Road conditions & hotspot of injury- Village or City Road/ State highway or National highway, Type of vehicle in road traffic injuries-Pedestrian/ Bicycle/ 2-4 wheeler/ domestic or commercial vehicle. The data was entered in Microsoft Excel and analyzed using SPSS version 20. Frequencies were obtained using descriptive statistics. Chi-square tests were used for finding out relation between socio demographic variables and injury. A p-value (two-tailed) of less than 0.05 was considered statistically significant.

Results

This community based cross-sectional study was conducted in district Srinagar of Kashmir valley after approval of protocol by the Institutional ethics committee. A total of 655 participants were

interviewed from all age groups in district Srinagar. Majority of them (20.2%) were in the age-group 21-30 years and mean age 34.03 years \pm 19.80 years. The study population comprised of 333 (50.8%) males and 322 (48.2) females. Kashmir valley being a Muslim majority division all the participants were Muslims. Among the participants, 290 (44.3%) were single, 329 (50.2%) were married and 36 (5.5%) were widowed. 113 (17.3%) of the participants owned a vehicle. Among the participants who were working 68 (25.9%) were having an income between 0 - 15000 (1st Quartile), 63 (25.1%) were having an income between 15001- 30000 (2nd Quartile), 72 (28.7%) had an income between 30001 - 50000 (3rd Quartile) & 51 (20.3%) had an income of greater than 50000 (Above 3rd Quartile) [Table 1]. The income population had a mean of 41,507.87. 577. Among the vehicle owners 19 (16.8%) owned two wheelers, 2 (1.8%) owned three wheelers and 92 (81.4%) owned four wheelers [Table 2]. (88.1%) participants were interviewed in self, while as 11 (1.7%) were proxy interviews when the interviewee was not available after trying to approach the interviewee three times or some other reasons. 67 (10.2%) were also proxy interviews either cause of age constraints, Intelligence quotient levels or other reasons and therefore were categorized as not applicable in person interviews. Among the relationship with the victim the proxy interviewees 70 (88.5%) were mother of the victim, 7 (9.0%) were father of the victim and 3 (1.5%) were son of the victim [Table 3]. Among the study population 170 (26.8%) were graduates. 195 (29.8%) of the participants were students. 129 (19.7%) participants were injured within last one year from the date of conducting of interview. Out of 655 participants, 91 (13.9%) suffered from minor injuries and 38 (5.8%) suffered major injuries. Majority of major injuries 16 (42.1%) had taken place 3-6 months before the date of conduct of interview. The prevalence of injuries in this study was 19.7% [Table 4].

Among the victims, 35 (27.1%) were involved in vital activities like eating, washing, bathing, using washroom at the time they got injured. Among the victims 27 (20.9%) got injured in a Road Traffic accident followed by fall and struck by a person/object with each sharing 23 (17.8%) to the total. Among the victims, majority suffered from unintentional injuries 102 (82.3%) followed by 16 (12.9%) as intentional injuries i.e., violence and the remaining as self-inflicted 5 (4.0%). 48 (37.2%) of the victims suffered from a cut/bite or other open wounds followed by 23 (17.8%) of bruise or superficial injuries as the nature of injuries.

26 (21.3%) of victims suffered injuries in the lower extremity of the body and among the type of injuries 57 (49.1%) victims suffered from penetrating injuries. The place of occurrence of an injury was mostly at homing in this study [Table 5]. Around 3/5th of injured suffered from a physical disability due to injuries in the study population [Table 6]. Around 4/5th of injured sought medical care [Table 7]. Around 4/5th of injured were affected in their usual activity due to injuries [Table 8]. 80% of deaths took place at the health facility only which may be cause of declaring of death also [Table 9].

Age was closely related to injuries in this study especially in the age group of 14-26 years [Table 10]. Males in the same age group of 14-26 years reported more injuries (30.4%) and over all too males were more injured (61.2%) as compared to females. In our study, among females, less than 14 years and in the age group of 53-65 years relatively (24% each) more injuries were reported as compared to other age groups.

Low income (less than Rs/- 15000 or 224.6\$ USD per month) or poverty was reported to be more associated with injuries (30.5%) with a spearman's rank correlation with a value of -0.032 with increase in income which although weak and statistically insignificant but shows a relation.

Table 1: Socio-demographic characteristics of study population.

n=655		
Age Groups in years	Frequency	Percent
≤ 10	88	13.4
11 – 20	94	14.4
21 – 30	132	20.2
31 – 40	114	17.4
41 – 50	66	10.1
51 – 60	85	13.0
61 – 70	61	9.3
71 – 80	14	2.1
≥ 81	1	.2
Sex distribution of study population		
Gender		
Male	333	50.8
Female	322	49.2
Marital status distribution in study population		
Marital Status		
Single	290	44.3
Married	329	50.2
Widowed	36	5.5
Distribution of Education status of the study population		
Educational Status		
Illiterate	79	12.1
Elementary School	143	21.8
High School	120	18.3
Higher Secondary	30	4.6
Graduate	170	26.0
Post Graduate	68	10.4
Doctorate	4	.6
Not Applicable	41	6.3
Distribution of Occupation of the study population		
Occupation Status		
Student	195	29.8
Home maker	137	20.9
Self Employed/Business	83	12.7
Government Employee	62	9.5
Retired	38	5.8
Professional	27	4.1
Private firm Employee	27	4.1
Unemployed (able to work)	20	3.1
Laborer	14	2.1
Unemployed (unable to work)	8	1.2
Driver	5	.8
Farmer	4	.6
Street Vendor	1	.2
Not Applicable	34	5.2
Income (quartile) of the study population		
Income Quartiles		
0 - 15000 (1 st Quartile)	68	10.4
15001- 30000 (2 nd Quartile)	63	9.6
30001 - 50000 (3 rd Quartile)	72	11.0
>50000 (Above 3 rd Quartile)	51	7.8
Total	254	38.8
Not Applicable	401	61.2
Total	655	100.0

Education had an inverse relation with injuries when we applied modeling, qualification higher than a graduate had an inverse relationship with injuries. In addition, the results also show no significant associations between education and injuries when taken in frequency groups, and this may be due to the lack of statistical power due to the small numbers analyzed in some of the qualification groups.

Table 2: Vehicle ownership of the study population.

Ownership	Frequency	Percent
Yes	113	17.3
No	542	82.7
Distribution of type of vehicle owned by the study population n=113		
Type of Vehicle	Frequency	Percent
Two wheeler	19	16.8
Three wheeler	2	1.8
Four wheeler	92	81.4

Table 3: Distribution of respondents as victims or proxy.

Respondents	Frequency	Percent
Victim	575	87.8
Proxy	11	1.7
Victim's interview not applicable*	69	10.5
Distribution of relationship with the Victim n=80		
Relationship with Victim	Frequency	Percent
Mother of the Victim	70	88.5
Father of the Victim	7	9.0
Son of the Victim	3	1.5
Total	80	100.0

*Since comprised of children less than 9yrs of age and 5 deceased

Table 4: Prevalence of injuries in the study population.

Injuries	Frequency	Percent
Present	129	19.7
Absent	526	80.3
Total	655	100.0
Prevalence of Minor injuries in the study population		
Minor injuries	Frequency	Percent
Present	91	13.9
Absent	564	86.1
Total	655	100.0
Prevalence of major injuries among study population		
Major injuries	Frequency	Percent
Present	38	5.8
Absent	617	94.2
Total	655	100.0

Table 5: Distribution of place of injury in the study population.

Place of injury	Frequency	Percent
Home	60	46.51
Commercial area (shop, store)	22	17.05
Street/Highway	21	16.28
Industrial or Construction site	8	6.20
School/College	4	3.10
Athletic and Sports area	4	3.10
Residential institution/hotels	3	2.33
Farm (excluding home)	3	2.33
Country side	2	1.55
Work place	1	0.78
Lakeside (water bodies surrounding areas)	1	0.78
Total	129	100.00

Thus the absence of significant associations does not imply that the effect of education on injury is negligible. Vehicle ownership was related to injuries especially to road traffic injuries in this study. Among the type of vehicles, two wheelers were strongly related to injuries.

Among the mechanism of injuries, Road traffic accidents were most common in this study with the prevalence of 4.1% followed by falls accounting to a prevalence of 3.5%. Both Road traffic accidents and

Table 6: Distribution of physical disability due to injuries in the study population.

Physical disability	Frequency	Percent
Yes	76	58.9
No	53	41.1
Total	129	100.0
Nature of physical disability in physically disabled due to injuries in the study population		
Nature of disability	Frequency	Percent
Difficulty while walking/walking with a limp	33	43.4
Difficulty using hand or arm	17	22.4
Unable to use hand or arm	15	19.7
Inability to chew food	7	9.2
Weakness or shortness of breath	3	3.9
Loss of Hearing	1	1.3
Total	76	100.0

Table 7: Status of medical care among the injured in the study population.

Status of medical care	Frequency	Percent
Injured	103	79.8
Hospitalized	21	16.3
Death at accident site	1	.8
Death in hospital	4	3.1
Distribution of seeking medical care outside the household among the injured in the study population		
Seeking Medical care	Frequency	Percent
Yes	100	77.5
No	29	22.5
Total	129	100.0
Distribution of place of medical care among the injured in the study population		
Place of medical care	Frequency	Percent
Government Hospital	65	57.5
Health Centre	14	12.4
Self-treatment	13	11.5
Pharmacy/drug store	8	7.1
General Practitioner	7	6.2
Private Hospital	2	1.8
Voluntary doctor	2	1.8
Homeopathic/Ayurvedic	1	0.9
Home remedy and self-treatment	1	0.9
Total*	113	100.0
Distribution of admission to health facility among those who sought medical care in the study population		
Admission to Health facility	Frequency	Percent
Yes	34	34.0
No	66	66.0
Total	100	100.0
Distribution of length of hospital stay among those who were admitted to health facility in the study population		
Number of days	Frequency	Percent
1- 7	26	76.5
8-30	7	20.6
31 - 90	1	2.9
Total	34	100.0

*In toto, 29 did not seek medical care outside household, but 13 victims performed self-treatment and the remaining 16 did not seek medical care at all

falls shared almost the same portion of injuries in this study. Road traffic accidents as the most common mechanism of injury which is in line with this study probably because there are same laws and their enactment to the same level on ground as compared to other countries, which might have a gross difference in ground rules. Close enough falls were the second common mechanism of injuries in this study.

This study reported Unintentional injuries (82.3%) to be the most common on the basis of human intent. This study reported extremities (67.2%) especially lower extremity along with foot (31.1%) as the most common region of the body involved in injuries. This study reported

cut, bite or other open wounds (37.2%) as the most common among nature of injuries followed by Bruise or Superficial injury (17.8%). This study reported Penetrating trauma (49.1%) as the most common type of injuries followed by blunt trauma (44.8%). Among two wheeler owners 60% were injured in road traffic accidents in this study. Among the injury related deaths 80% took place at a health facility e.g., hospital, clinic, health center or any other health care provider. Among the injury related deaths 50% were internal organ injury and/or Head injury which although occurred at the hospital but the delay in pre-hospital phase can also be responsible for the same.

Table 8: Effect on usual activities post injury in the study population.

Effect on usual activity	Frequency	Percent
Yes	100	77.5
No	29	22.5
Total	129	100.0
Type of effect on usual activities post injury in the study population		
Type of effect on usual activities	Frequency	Percent
Inability to use hand or arm or decreased strength of the upper extremity	33	33.0
Walk with a limp or unable to walk at all	32	32.0
Loss of vision	3	3.0
Weakness or shortness of breath	2	2.0
Inability to chew food	7	7.0
Pain at a specific site or generalized discomfort	22	22.0
Inability to use hand or arm or decreased strength of the upper extremity & unable to walk	1	1.0
Total	100	100.0
Distribution of return to normal activity among affected post injury in the study population		
Return to normal activity	Frequency	Percent
Yes, fully	87	82.8
Yes, but only partially	10	9.5
Permanently disabled	3	3.1
Death (post injury)	5	4.6
Total	105	100.0
Distribution of loss of employment in the study population		
Loss of employment	Frequency	Percent
Yes	37	37.8
No	61	62.2
Total*	98	100.0
Distribution of household member loss of work/school in the study population		
Loss of work/school	Frequency	Percent
Yes	44	34.2
No	59	45.7
Didn't remember/Not applicable	26	20.1
Total	129	100
Distribution of money spent on the treatment of the injured in the study population		
Rupees	Frequency	Percent
1 – 1000	53	41.1
1001 - 5000	24	18.6
5001 - 10000	6	4.6
10001- 50000	13	10.0
50001 - 300000	2	1.6
Not applicable	31	24.1
Total	129	100

*31 injuries who were excluded comprised of children less than 9, retired, home maker and unemployed

Table 9: Distribution of place of death due to injury in the study population.

Place of death	Frequency	Percent
At the place of injury	1	20.0
At a health facility	4	80.0
Distribution of time of death due to injury in the study population		
Time of death	Frequency	Percent
< 1 hour after injury	3	60.0
1- 6 hour after injury	1	20.0
>1 day but less than 1 week after injury	1	20.0
Total	5	100.0

Discussion

Injuries are considered the 9th most common cause of mortality in the world and will be the most common cause of mortality by 2030. The prevalence of injuries in this study was 19.7% which is almost similar to the community based study done in other states (viz., Maharashtra) of the country^[7] as well as outside country viz., Sierra Leone with the prevalence of 12.4% by Stewart et al.^[8] Age was closely related

to injuries in this study especially in the age group of 14-26 years (23.9%). Moore et al. 2014 in United States of America^[9] also reported age as a strong factor influencing injuries especially in 10-19 year olds.

Males in the same age group of 14-26 years reported more injuries (30.4%) and over all too males were more injured (61.2%) as compared to females. Moore et al.^[9] also reported similar findings from United

Table 10: Relationship between various variables and injury status.

Age Groups	Injury status		Total (100%)
	Injured N (%)	Not injured N (%)	
≤13	21 (17.9)	96 (82.1)	117
14 - 26	34 (23.9)	108 (76.1)	142
27 - 39	19 (12.6)	132 (87.4)	151
40 - 52	23 (23.3)	76 (76.7)	99
53 - 65	21 (19.5)	87 (80.5)	108
66+	11 (28.9)	27 (71.1)	38
Total	129	526	655

Chi square statistics=9.5, df=5, p-value=0.09

Age Groups	Injury status		Total (100%)
	Injured N (%)	Not injured N (%)	
≤13	9 (15.0)	51 (85.0)	60
14 - 26	24 (34.8)	45 (65.2)	69
27 - 39	15 (18.8)	65 (81.2)	80
40 - 52	18 (36.7)	31 (63.3)	49
53 - 65	9 (16.7)	45 (83.3)	54
66+	4 (19.0)	17 (81.0)	21
Total	79	254	333

Chi square statistics=14.02, df=5, p-value=0.01

Marital Status	Injury status		Total (100%)
	Injured N (%)	Not injured N (%)	
Single	64 (22.0)	226 (78.0)	290
Married	51 (15.5)	278 (74.5)	329
Widow	14 (38.8)	22 (61.2)	36
Total	129	526	655

Chi square statistics=13.07, df=2, p-value=0.001

Gender	Injury status		Total (100%)
	Injured N (%)	Not injured N (%)	
Males	79 (21.0)	254 (79.0)	333
Females	50 (15.5)	272 (84.5)	322
Total	129	526	655

Chi square statistic=6.9, df=1, p-value =0.008

Vehicle ownership	Injury status		Total (100%)
	Injured N (%)	Not injured N (%)	
Vehicle owned	32 (28.0)	81 (72.0)	114
Does not own	97 (13.8)	445 (82.2)	541
Total	129	526	655

Chi square statistic=6.1, df=1, p-value=0.0

Type of vehicle	Injury status		Total (100%)
	Injured N (%)	Not injured N (%)	
Two wheeler	10 (52.6)	9 (47.4)	19
Three and Four wheeler	22 (23.4)	72 (76.5)	94
Total	32	81	113

Chi square statistics=6.6, df=1, p-value=0.01

states of America with a strong predilection of males as 3 times more susceptible to injuries as compared to females while as we found males as 1.5 times higher chance of getting injured as compared to females in Kashmir valley. Males possibly had higher injury rates than females because they were more often exposed to hazards. Similarly, Pant et al. [10] also reported adolescents as the most common age group susceptible to injuries in Nepal. Bartolomeo et al. [11] also reported males as the most common injured gender in Italy. Another study conducted by Moshiro et al. [12] also reported males as more commonly injured as compared to females in Tanzania. Baset et al. [13] also reported males

more commonly injured as compared to females in Bangladesh. In our study, among females less than 14 years and in the age group of 53-65 years relatively (24% each) more injuries were reported as compared to other age groups. Bansal et al. [14] also reported injuries most common in the age groups of less than 15 and more than 60 years.

Low income (less than Rs 15000 or 224.6\$ USD per month) or poverty was reported to be more associated with injuries (30.5%) with a spearman's rank correlation with a value of -0.032 with increase in income which although weak and statistically insignificant but shows

a relation. Socio-economic status plays a major role in determining the magnitude, pattern and severity of injuries and diseases in different countries.^[15] Some studies have shown that low socio-economic status is related to injury risk, but the results are non-linear and inconsistent.^[16] Poor and rich people tend to be exposed to different risks leading to their injuries. In Srinagar, poor households usually have slippery or rough floors, poor quality kitchens and a low general quality of housing, which expose people to higher risks of injury, due mainly to falls, scalds and fires. Poor adults were at greater risk of injuries at work, possibly because people living under harsh economic conditions may be willing, or forced, to accept jobs that expose them to extremely high risks or unsafe conditions. The relationship between low socio-economic status or poverty and high risk of injuries is well documented.^[17] For example, Plitponkarnpim found a strong negative relationship between child injury mortality rates and gross national product (GNP) per capita at the national level.

Education had an inverse relation with injuries when we applied modeling, qualification higher than a graduate had an inverse relationship with injuries. In addition, the results also show no significant associations between education and injuries when taken in frequency groups, and this may be due to the lack of statistical power due to the small numbers analyzed in some of the qualification groups. Thus the absence of significant associations does not imply that the effect of education on injury is negligible. Gotsens et al.^[18] also reported almost similar findings in relation to injuries in 15 European cities. Similarly, Laflamme et al.^[19] also reported low socio economic background strongly related to injuries.

Vehicle ownership was related to injuries especially to road traffic injuries in this study. Among the type of vehicles, two wheelers were strongly related to injuries. Similar findings were reported by World Health organization, 2013 on risk factors associated with injuries.^[20]

Among the mechanism of injuries Road traffic accidents were the most common in this study with the prevalence of 4.1% followed by Falls accounting to a prevalence of 3.5%. Both Road traffic accidents and falls shared almost the same portion of injuries in this study. Road traffic accidents were reported as most common mechanism of injuries by Bartolomeo et al.^[11] They reported road traffic accidents as the leading mechanisms (81%) of injuries. Another study done by Bansal et al.^[14] also reported road traffic accidents as the most common mechanism of injury (24%). Similarly, Azubuike et al.^[21] also reported similar findings as road traffic accident being the most common mechanism of injuries. The studies done in India mostly reported Road traffic accidents as the most common mechanism of injury which is in line with this study probably because there are same laws and their enactment to the same level on ground as compared to other countries which might have a gross difference in ground rules. Close enough falls were the second common mechanism of injuries in this study which was also reported by Stewart et al.^[8] Similarly, Duan et al.^[22] also reported falls as the most common mechanism of injuries followed by Road traffic accidents as the second. Another study done by Tripathy et al.^[23] also reported fall as the most common mechanism of injury. One more study done by Nodrberg et al.^[24] also reported fall as the most common mechanism of injury. Olawale et al.^[25] also reported falls and traffic injuries as common mechanisms of injuries.

The place of occurrence of an injury was mostly at home in this study. Sharma et al.^[26] also reported similar results where majority of all major injuries occurred at home (32.3%). Another study from India also reported similar results, Bansali et al.^[14] also reported home as the most common place where injuries occurred specially among children & elderly. Similarly, Ghimre et al.^[27] from Nepal also reported home was the most common place of injury. This study reported Unintentional injuries (82.3%) to be the most common on the basis of human intent

which is coherent with Gosavi et al.^[7] who reported 94.0% of injuries as unintentional based on human intent.

This study reported extremities (67.2%) especially lower extremity along with foot (31.1%) as the most common region of the body involved in injuries which has been reported also by Stewart et al.^[28] in Sierra Leone as extremities were the most commonly injured part of the body. Similarly Dandona et al.^[29] reported from Andhra Pradesh as legs to be the most common region of the body injured. Another study done by Verma et al.^[30] also reported lower limbs as the most common part of the body injured in Delhi.

This study reported cut, bite or other open wounds (37.2%) as the most common among nature of injuries followed by Bruise or Superficial injury (17.8%) which is almost similar as reported by Bansal et al.^[14] in Madhya Pradesh, India as cutting and crushing injuries to be the most common among nature of injuries. Similarly, Hedstrom et al.^[31] also reported open wounds, abrasions and contusions to be the most common among nature of injuries in Sweden. Close enough Verma et al.^[30] also mentioned Superficial injuries as the most common type in Delhi. This study reported Penetrating trauma (49.1%) as the most common type of injuries followed by blunt trauma (44.8%) which is almost similar to that being reported by other studies where blunt and penetrating trauma share a close line. Bartolomeo et al.^[11] also reported blunt trauma as the most common type.

This study's findings about basic risk factors (age, sex) are consistent with other studies in India as well as in other countries. The important risk factors were male, poverty, vehicle ownership, less education. Among two wheeler owners 60% were injured in road traffic accidents in this study which has also been reported by Saadat et al.^[32]

Among the injury related deaths 80% took place at a health facility e.g., hospital, clinic, health centre or any other health care provider which is almost similar to the findings reported by Radjou et al.^[33] who found out that 63% of deaths occurred within a week of consulting a health care provider at any facility. Although, some other studies report majority of deaths in pre-hospital phase.^[34] The majority of deaths at a health facility in our study is partly explained by the predominantly urban area in which the study was conducted since primary care centers would have been readily available in the city but on the contrary the time consumption on referral of the victim due to unavailability of advanced life supporting measures in the health care facilities lead to death in hospital phase. In addition, the death also depends on the nature of injuries of the population. Among the injury related deaths 50% were internal organ injury and/or Head injury which although occurred at the hospital but the delay in pre-hospital phase can also be responsible for the same. Another important factor which might influence the high death rate at hospital is bringing the patient to the hospital to confirm the death.

Conclusion

The study shows that injuries are an important health problem in Kashmir valley. Obviously the prevalence rate of 19.8% reflects almost one fifth of the population being injured every year. Its prevalence is higher among males (23.7%), adolescents and youth (20.3%) in particular. Road traffic injuries topped the list among the injuries observed in district Srinagar that led to 3.7% mortality and 92.5% morbidity and thus led to disability with adverse socioeconomic burden. Considerable proportion of those injured was disabled temporarily for some time which affected their productivity and also became a socioeconomic burden on the society as a whole. The study also show cased unintentional non-fatal injuries in Srinagar which are not usually considered to be of public health importance. Incidentally, Home injury was found to be the most frequent occurrence in this area, often due to the lack of proper kitchens and hazardous home surroundings.

Recommendations

Some prevention strategies might include health education and raising awareness about the possible dangers of injury and the importance of seeking appropriate care following injury. Prevention strategies for avoiding household hazards could include having better light in the evening; making gravel paths around the house and clearing moss to avoid slipping; wearing protective clothing when using electromechanical equipment and improving kitchens. More attention needs to be given to preventing injuries amongst users of motorised vehicles, such as the use of helmets, seat belts, driver education and most important effective laws e.g., issuing driving license after proper examinations. It would be useful to develop methods for protecting pedestrians and cyclists from road traffic accidents, such as having effective separate paths for pedestrians and cyclists, and improving road surfaces to reduce slip hazards. In order to reduce work-related injuries, efforts could include educating farmers on safe working practices, such as not throwing empty glass pesticide bottles into the farm, and wearing shoes or boots when working in wet fields. Community education strategies could help people recognize, demand, and obtain better care and know what they might expect to pay for treatment in private contexts. Developing possible pre-payment schemes for people who are not covered by any kind of insurance in rural areas may also be important, in parallel with promoting health insurance among appropriate sectors of the population, in helping people to reduce the burden of injuries. Injury prevention strategies need to contain combinations of many levels and types of action. Many techniques and methods need to be used, including media interventions, presentation of local data, the publication of other types of information and advice, education of professional groups (as well as members of community and community organizations), supervision through safety rounds and check lists, environmental control, and product development. The first step is to determine the magnitude, scope and characteristics of the problem. The second step is to identify the factors that increase the risk of disease, injury or disability, and to determine which factors are potentially modifiable. The third step is to assess what measures can be taken to prevent the problem by using the information about causes and risk factors to design, pilot test and evaluate interventions. The final step is to implement the most promising interventions on a broad scale. This thesis contributes to the first, second and somewhat to the third step above. It provides a data on the magnitude of injuries in the Kashmiri community. Information on the risk factors and the potential to modify these factors is achieved with the hope that the information will be useful for the last two steps, which must be based on good injury surveys in answer to the first and second steps. Injuries are recognized as an important health problem in Kashmir as well as in many developing countries nowadays. As in other developing countries, the Government of India is faced with seriously inadequate information on injuries for developing and implementing an effective national injury prevention programme. This study was done with intention of contributing results to the Ministry of Health's injury prevention programme as well as providing a methodology for future injury assessments. I have demonstrated that injury is an important health problem in Srinagar, and identified some specific groups of high-risk individuals and injury types. It was considered important to explore the relationship between risk factors and injuries in a representative sample of population at the community level. The data from this study also allows improved understanding of health service utilization in this environment, with resulting implications for health service policy. The information from different phases in this study should help decision makers and citizens in their efforts to prevent injuries and accidents in Jammu & Kashmir, especially in urban areas. The study may also be valuable as a baseline description for future preventive measures that will need to evaluate changes in prevalence and patterns of injury as well as economic analyses, since any future intervention programme should be evaluated by comparing results with the pre-existing magnitude of problem and the costs of injuries. The injury related morbidity rates reported in this

study indicated that injury in developing nations should receive more attention and should be placed higher on the agendas of international health policy. Equity in health and equal access to healthcare are major targets in most health policies. India is in rapid transition from central planning to a market oriented economy. The market-oriented changes have produced great economic growth together with new problems in health and healthcare, such as new risks for traffic injuries or high health care fees. In the transitional period of national development, we should not neglect the possible increasing rates of accidents and injuries along with the process of modernizing society.

The problem of injury being the neglected disease of modern society is especially true in today's developing nations.^[35] Thus the results reported here provide a valuable insight into the scope for further health gain in India. This information will assist in taking up the future challenges presented by the current transitional period in Jammu & Kashmir, even in India, as well as in other developing countries, by preventing injuries and by the increasing the use of health services. The linkage between injury epidemiology and cost-effectiveness studies of interventions for this important public health problem is essential.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

Dr. Rabbanie conceptualized the study, conducted the analysis and composed the manuscript and interpreted the results and revised the manuscript. Dr. Salim interpreted the results and revised the manuscript. All authors read and approved the final manuscript.

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