

# Injury occurrence among residents in a semi-urban area in Sri Lanka; A community survey

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**Abstract-** Injuries were the leading cause of hospital admissions in Sri Lanka for the past two decades. Common causes for injuries in Sri Lanka are road traffic crashes, falls, animal bites, occupational accidents, violence and humanitarian crisis. However, community based data on injuries in Sri Lanka is scarce. Therefore, the objective of this study was to describe the occurrence of injuries and the associated factors in a semi-urban community in Central Sri Lanka. A community-based descriptive cross-sectional study was conducted in Gangawatakorale administrative area among 696 households selected by cluster sampling which included 3110 household dwelling residents.

The incidence of injuries among all age groups was 17.7 per 1000 population per six months (n=55, 95% CI: 12.2-24.6). Age of the participants with injuries ranged from 2-83 years (Mean=33.8, SD=21.8). The majority were less than 30 years (49.1%, n=27) and were of low income families (56.4%, n=31). More males (63.6%, n=35) were injured than females (36.4%, n=20) (p<0.05). The mechanism of injury were fall from height (38.2%, n=21), road traffic crashes (29.1%, n=16), animal bites (9.1%, n=5), sports injuries (7.3%, n= 4), cut injuries (7.3 %, n=4), poisoning (5.4%, n=3) and burns (3.6%, n=2). Lower limbs were the commonest affected site by injury (41.8 %, n=23).

Considering the high prevalence of injuries related to falls from heights, road traffic crashes and animal bites across all age groups, interventions in the form of targeted injury prevention programs for different age and sex groups, based on local epidemiology are needed for this population.

**Index Terms-** injury prevalence, mechanisms of injuries, unintentional injuries, Sri Lanka

## I. INTRODUCTION

Injuries have become a major public health problem worldwide. It is one of the leading causes of death around the world accounting 10% of deaths worldwide (1). Further, every five seconds one person in the world dies due to injury(1). Each year, nearly 5.8 million people around the world perish as a result of an injury(1). In the context of Sri Lanka, injuries were the leading cause of hospital admissions since 1995. In 2003, 16.7% of total admissions and 11% of deaths in government health institutions were due to injuries. Intriguingly, the injury burden is spread across all districts in Sri Lanka. Injury was ranked as the number one reason for hospital admissions in 18 of the 23 districts and in the other districts; it was among the top 5 reasons (2).

Injuries can be broadly divided into three categories, namely; intentional, unintentional and undetermined intent(3). According to WHO, the term “injury” was used to describe the physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy. It could 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 (3).

Injuries contribute to the majority of adolescent and young adult deaths(1). Injuries include those from road traffic injuries, poisoning, drowning, fires/ burns, falls and etc. Although there are many studies on injuries in other countries, it is an area which is very less explored in Sri Lanka. In particular, there is only a very few community studies on injury statistics in Sri Lanka. In a study done in Southern Sri Lanka in 2009 has revealed that the age sex urban rural adjusted annual incidence of non-fatal injuries is 24.6 per 100 population for 30 days duration (4). Another study done in a rural community of Yatinuwara, in central Sri Lanka in 2008 has given a major physical injuries incidence of 82.6 per 1000 person years (5).

The present study was conducted in order to find out the incidence of injury occurrence in Sri Lanka as well as to explore the mechanisms or causes of injury and associated factors. In a rural community study done in Sri Lanka has revealed that animal bites(28.2%) was the main cause of injury followed by falls(18.8%) and objects fallen on the victim(17.6%). Further, the commonest place of injury according to that study was road (41.1%), home(34%) and factory(14%) and the highest injury occurrence was reported among the age group of 25-45 years(34%).<sup>5</sup> Even within Sri Lanka, the causes for injury remains specific to geographical locations and demographic and socio-economic factors. A community survey done in Southern Sri Lanka in Galle district has shown that the falls (26.7%), mechanical injuries (25.6%), road traffic injuries (20.5%) and animal bites (16.9%) are the leading causes of non-fatal injuries (4). Another study based on secondary data on all deaths from injury in North Central Province of Sri Lanka has revealed that poisoning was the most common cause of death being 3.9 fold more common than road traffic accidents(6).

There are studies on specific injury types done in hospital settings using patient samples or patient records. According to a retrospective study performed by analyzing patient records of the Burns and Reconstructive Surgical Unit, National Hospital of Sri Lanka for a period of 18 months there were 46 acid burn patients

due to assaults, accounting for 4% of the total number of burn patients during the period. The age range of the cases was 12 to 60 years, and 63% of the patients were between 21 and 40 years. The male to female ratio was 2.8:1(7). Another study done using a convenient sample of 824 Army servicemen who were referred to the psychiatric ward in the military hospital of Colombo during August 2002 to March 2006 period, revealed that 29(3.52%) had undergone traumatic brain injuries during the civil unrest which lasted from 1983-2009 in Sri Lanka(8).

The difference in the causative mechanisms of injuries varies between countries as well. It is shown by the studies done in India, the neighboring country of Sri Lanka. A descriptive study done in rural areas of Puducherry, India among 1900 individuals with a 3months recall period has reported the common mechanisms of injury as fire(25.5%), falls(20.8%) and road traffic injuries(15.1%). This study further reported that majority of the injuries had occurred at home (44.7%) and that injuries were more among adults(71%) aged 15 to 59 years followed by children(21%)(9). A similar survey done in rural Pondicherry has revealed that the most common causes of injuries were fall on the ground from height or due to slip (7.4%), road traffic accidents (5.6%), agriculture related injuries (5%) and bites by scorpion/insects/snakes/dogs (4.1%)(10).

Injuries impose a heavy health burden especially on the poor in low and middle income countries.<sup>1</sup> As Sri Lanka is undergoing a major socio-demographic, epidemiological, and technological transition, injuries have become an emerging public health problem. Today, injuries are no longer random or unavoidable but are considered being predictable and largely preventable (1). They could be prevented by adjusting individuals' lifestyle, health habits and risks. Early detection and prompt action is essential to keep the injuries as well as disabilities and fatalities caused by injuries to a minimum. In order to plan preventive strategies the community based epidemiological distribution of occurrence of injuries and associated factors are required. As community based studies on injuries are scarce in Sri Lanka, this study was conducted to collect data on the occurrence of injuries and their associated factors.

## II. MATERIALS AND METHODS

The present study was conducted in Gangawatakorale administrative area in the Kandy district of the Central Sri Lanka. Gangawatakorale is located in the district of Kandy 6 kilometers from the Kandy city, the hill capital of Sri Lanka. It has a tropical climate and a multi-ethnic population where majority are Sinhala Buddhists. Gangawatakorale is a 29.4 square kilometers area and it consists of 25 Grama Niladari areas (smallest administrative unit in the country). It consists of a total population of 53,280 and 14928 households. There are 47315 females and 42139 males with a female to male ratio of 1.1(11).

Study population was all individuals residing in the Gangawatakorale area on the date of interview. Individuals residing in Gangawatakorale area irrespective of age having the ability to understand and speak Sinhala language and who consented participation in the study were included as study participants. Study unit was an individual in Gangawatakorale area who fulfills the inclusion criteria.

The survey sample was selected using a cluster sampling technique with probability proportionate to size. Sample size was calculated using an expected incidence of injury of 8%(5), Z value corresponding to the required level of confidence of 1.96 and with a required level of precision of 0.05 with a cluster effect of 2 and a non-response rate of 5% (12) Therefore, the final sample size was 3060 individuals. Considering the average household size is 4.4 members(13), a sample size of 696 households was estimated to achieve the sample size of 3060. A household was defined as a group of individuals living together and eating from the same kitchen(4). Clusters were selected from GN areas which is the smallest administrative unit in Gangawatakorale administrative area which is the primary sampling unit (PSU) in the present study. Clusters were identified according to their probability of selection being proportional to size. In each GN area there is an electoral register which is updated annually regarding names and addresses of the chief occupant of a household and it was used as the sampling frame to select 30 individuals from each of the PSU. The starting point of the cluster was identified randomly using a random digit number and the adjacent households to the right of the starting point were covered to complete 30 households. Government and private institutions, schools, religious places were excluded from the survey. All the individuals in a household who met the selection criteria were included into the survey. If there was no one in a house, second visit was done on the next day. If they cannot be contacted it was replaced by the house adjacent to the last selected household.

Study instrument was an interviewer administered questionnaire (IAQ) and it was designed following an extensive literature search on injury statistics and a series of panel discussions with the experts in the injury research in Sri Lanka. Validity of the questionnaire was ensured by assessing the face validity, content validity and consensual validity by a team of experts in the fields of public health and injury. Each question in the questionnaire was assessed for its relevance in assessing injury and associated factors, appropriateness of the wording used and acceptability in the local context. Necessary changes were made based on their recommendations. Questionnaires were pre-tested at a different setting to test the feasibility of the instrument. Therefore, the questionnaire was pre-tested among a group of Sinhala speaking people in Matale district which is an adjacent area of the study setting. Clarity, sequence of questions, average time required to complete the questionnaire, willingness to participate and overall feasibility of conducting the study were assessed in the pre-test. Following the pre-test necessary alterations were done.

Data was collected by 13 data collectors who are G.C.E. (Advanced Level)/ high school level qualified. A two day training session was given for all data collectors by the PI one week prior to the commencement of the field work. During that programme, the purpose of the study was carefully explained. The importance of taking informed written consent, ensuring confidentiality and minimizing non-response were emphasized. Training on how to administer the IAQ was also included. Necessary precautions that have to be taken in order to obtain reliable and accurate data were also highlighted.

In the data collection proper, data collectors explained the purpose of the study and the nature of the information collected

to the participants. Following the explanation regarding the study, an opportunity was given to the participants to decide whether they like to participate or not in the study. The trained data collectors paid home visits to 696 households during May-June 2013 covering 3110 residents. Interviews were done in the afternoon hours. Majority of the data was obtained from the research participants and whenever the participants were unavailable or having conditions like deaf and dumb, data was obtained from the housewife assuming that she is more aware of the injury history of all household members (3).

After obtaining informed written consent, information on the occurrence of injuries to each family member in past six months prior to the interview and related factors were collected from the relevant research participant or the housewife of the household using pre-designed and pre-tested questionnaire. For the purposes of the present study, the term “injury” was used to describe the 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(3). Disability was defined as a temporary loss of function for more than one week or permanent loss of function (partial or complete) of part of the body(5). The information on injury was collected and classified according to the ‘mechanism of injury’ such as falls from height/due to slip, road traffic accidents, animal bites, sports injuries, poisoning etc. A structured checklist of common injuries was used to facilitate recalling injuries of study participants. To enhance quality of the data, answers were cross checked with the medical records whenever possible and completed questionnaires were checked

for completeness on the same day of the interview. Five percent of the questionnaires were re-checked by the PI. We could obtain information for 707(97.2%) households, 12 (1.7%) houses were locked and no one of the households refused to participate in the study. Guidelines for conducting community surveys on injuries and violence given by World Health Organization were used for planning this study (3). The data was summarized and incidence and percentages were calculated with 95% Confidence Intervals (CI) using (SPSS)V.13.0(SPSS Inc, Chicago, Illinois, USA) software package.

The study participants who were in need of any further management were directed to appropriate referral centers. All possible efforts were taken during data collection to minimize the disturbances to the day-to-day activities of the respondents. Ethical approval was obtained from the Ethical Review Committee, Faculty of Medicine of University of Peradeniya.

### III. RESULTS

Data was collected from 3110 individuals living in 696 households. The incidence of injuries among all age groups was 17.7 per 1000 population per six months (n=55, 95% CI: 12.2-24.6). Age of the participants with injuries ranged from 2-83 years (Mean=33.8, SD=21.8). Among injured persons, majority (n=14, 25.5%) were below the age of 18 years, while the next highest number of injuries were reported in the age group of 41 to 50 years (n=13, 23.6%).

Age distribution of the study population and number of injuries in each age group are given in Table I.

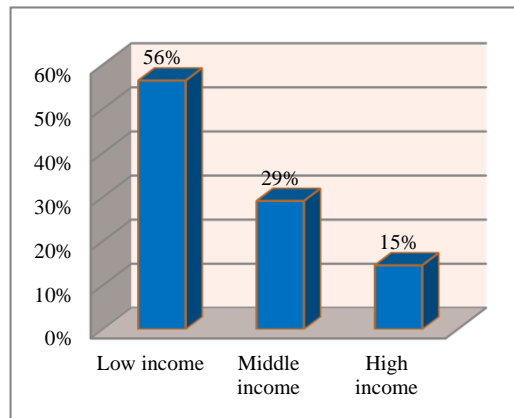
**Table I: Age distribution of the study population and number of injuries in each age group**

Age groups(years)	Number of people in the community n=3110(%)	Number of people injured in each age group n=3110(%)	SE*	95%CI ~	Number of injuries in each age group as a percentage of total number of injuries(n=55)
Less than 18	496(15.9)	14(2.82)	0.74	1.36-4.28	25.5
18 to 30	531(17.1)	5(0.94)	0.42	0.12-1.76	9.1
31 to 40	742(23.8)	6(0.81)	0.33	0.17-1.45	10.9
41 to 50	501(16.1)	13(2.59)	0.71	1.2-3.98	23.6
51 to 60	444(14.3)	9(2.03)	0.67	0.72-3.34	16.4
More than 60	396(12.7)	8(2.02)	0.71	0.63-3.41	14.5
Total	3110(100)	55( 1.76 )	0.24	1.3-2.22	100.0

\* Standard error of age specific injury proportions

~95% confidence interval (CI) calculated for each age specific injury proportions

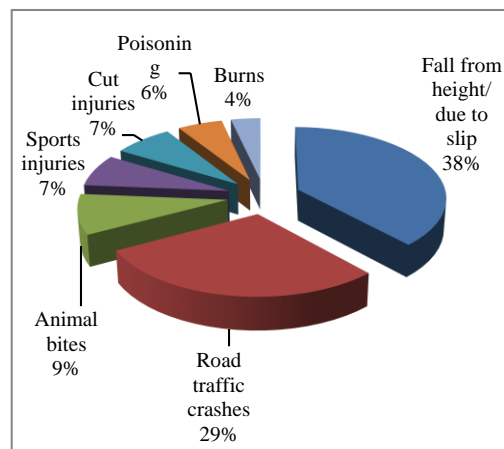
Injuries among males were significantly higher (63.6%, n=35) than among females (36.4%, n=20) (p<0.05). The majority were of low income families (monthly family income less than US\$ 250) (56.4%, n=31) (Figure 1).



**Figure1: Distribution of persons with injuries according to income**

Most of the injuries, 46 (83.6%) were reported to be recovered, 8 (14.6%) led to disability and remaining 1 (1.8%) resulted in death. Among the injuries reported, 96.4% (n=53) were of accidental nature.

The mechanism of injury reported were fall from height/due to slip (38.2%, n=21), road traffic crashes (29.1%, n=16), animal bites (snake/dog/wasp) (9.1%, n=5), sports injuries (7.3%, n= 4), cut injuries (7.3 %, n=4), poisoning (5.4%, n=3) and burns (3.6%, n=2) (Figure 2).



**Figure 2: Distribution of persons with injuries according to mechanism of injury**

Table II gives the distribution of study population according to mechanism of injuries. The percentage of total population is highest for falls from height (0.67%) followed by road traffic accidents (0.51%).

**Table II: Distribution of study population according to mechanism of injuries**

Mechanism of injuries	Mechanism of injury(% of total injuries) n=55	Mechanism of injury(% of total population)n=3110	SE*	95%CI <sup>~</sup>
Fall from height/ due to slip	21(38.2)	0.67	0.15	0.4-1.0
Road traffic crashes	16(29.1)	0.51	0.13	0.3-0.8
Animal bites (snake/dog/wasp)	5(9.1)	0.16	0.07	0.0-0.3
Sports injuries	4(7.3)	0.13	0.06	0.0-0.3
Cut injuries	4(7.3)	0.13	0.06	0.0-0.3
Poisoning	3(5.4)	0.10	0.06	-0.0-0.2
Burns	2(3.6)	0.06	0.04	-0.0-0.2

\* Standard error of the mechanism of injuries as a proportion of the total population

<sup>~</sup>95% confidence interval (CI) calculated for mechanism of injuries for the total population

Table III gives the distribution of mechanism of injuries across different age groups. Most common injuries which occurred among individuals < 18 years old, were falls from height/due to slip (n=8, 57.6%), road traffic crashes (n=2, 14.3%) and burns (n=2, 14.3%). In adults (18-59 years), common injuries were road traffic crashes (n=12, 36.4%), falls from height/ due to slip (n=9, 27.2%), animal

bites like dog, snake or wasp (n=3, 9.1%) and poisoning (n=3, 9.1%), cut injuries (n=3, 9.1%) and sports injuries (n=3, 9.1%). However, among older population (60+ years), majority had falls on ground from height/ due to slip and (n=4, 50%) followed by road traffic crashes (n= 2, 25%) and animal bites by snake/dog/wasp (n= 2, 25%).

**Table III: Distribution of mechanism of injuries across different age groups**

No	Mechanism of injuries	Age						Total	
		Less than 18 years		18-59 years		60 or above		No	%
		No	%	No	%	No	%		
i	Road traffic crashes	2	14.3	12	36.4	2	25.0	16	29.1
ii	Animal bites(snake/dog/wasp)	0	0	3	9.1	2	25	5	9.1
iii	Falls from heights/ due to slip	8	57.6	9	27.2	4	50	21	38.2
iv	Burns	2	14.3	0	0	0	0	2	3.6
v	Poisoning	0	0	3	9.1	0	0	3	5.4
vi	Cut injuries	1	7.1	3	9.1	0	0	4	7.3
vii	Sports injuries	1	7.1	3	9.1	0	0	4	7.3
	Total	14	100	33	100	8	100	55	100

Table IV demonstrates the distribution of mechanism of injuries according to sex. Among males, falls on the ground from heights/ due to slip (n=14, 40%) were higher than road traffic crashes (n=11, 31.4%). Similarly, among females, majority had undergone falls from heights/ due to slip (n=7, 35%) followed by road traffic crashes (n=5, 25%).

**Table IV: Distribution of mechanism of injuries according to sex**

No	Mechanism of injuries	Sex				Total	
		Female		Male		No	%
		No	%	No	%		
i	Road traffic crashes	5	25	11	31.4	16	29.1
ii	Animal bites(snake/dog/wasp)	4	20	1	2.9	5	9.1
iii	Falls from heights/ due to slip	7	35	14	40	21	38.2
iv	Burns	0	0	2	5.7	2	3.6
v	Poisoning	2	10	1	2.9	3	5.4
vi	Cut injuries	1	5	3	8.6	4	7.3
vii	Sports injuries	1	5	3	8.6	4	7.3
	Total	20	100	35	100	55	100

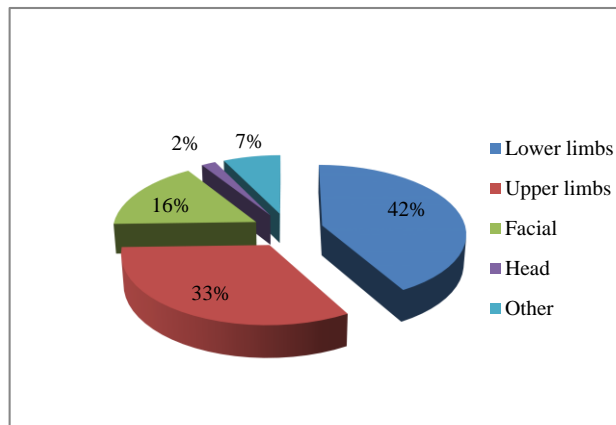
Table V describes the injuries according to place of occurrence. Majority of the injuries have occurred in the homes of the study participants. Further 25.5% (n=14) injuries have occurred inside the homes while 12.7% (n=7) has occurred in the home garden. The second commonest place of injury occurrence was road (29.1%, n=16) followed by workplace (20%, n=11).

**Table V: Distribution of study population according to place of injury occurrence**

Place of injury	Site of injury(% of total injuries) n=55	Site of injury (% of total population) n=3110	SE	95%CI
Home:				
Inside home	14(25.4)	0.45	0.12	0.2-0.7
Home garden	7 (12.7)	0.22	0.08	0.1-0.4
Workplace	11(20.0)	0.35	0.11	0.1-0.6
Road	16(29.1)	0.51	0.13	0.3-0.8
School	4(7.3)	0.13	0.06	0.0-0.3
Recreational facility(play-ground, gymnasium)	3(5.5)	0.10	0.06	-0.0-0.2

\* Standard error of the mechanism of injuries as a proportion of the total population  
~95% confidence interval (CI) calculated for mechanism of injuries for the total population

Among the injured individuals, 25.5% (n=14) had experienced injuries in more than one site. Commonest site of injury were limbs: lower limbs in 42% (n=23). There were 32.7% (n=18) with upper limbs injuries. Facial injuries were reported by 16.4% (n=9) and two (1.8%) head injury was reported (Figure 3).



**Figure 3: Distribution of injured people according to site of injury**

Majority (70.9%, n=39) of injured persons had obtained allopathic treatment, while 12.7% (n=7) obtained Ayurvedic treatment and 21.8% (n=12) obtained both types of treatment modalities. Ritualistic treatments in Sri Lanka included reading horoscope, wearing a yantra/ “epa noola” (blessed necklace/bracelet/ring), dehi kapeema (cutting lime), Thovil/Bali/ Yaga (ancestral devil and god worshipping celebrations), bodhi pooja (worshipping Bo-tree), “bara weema” (help from gods), praying for relief from illness. Among those with injuries, 22% had sought ritualistic treatments in the present study.

#### IV. DISCUSSION

The present community survey is of high importance since it provides data on all injury occurrences together with the data on place of occurrence, site of injuries and type of treatments obtained and it could be further characterized based on parameters such as demographic subpopulations and socio-economic subgroups. This enables identification of high risk individuals and to set up preventive measures and evaluated as patterns of injuries vary from one community to another. Further assessment of the incidence facilitates identification of the socio-economic impact to the country incurred by the cost of treatment

and loss of productivity. This study further describes the utilization of health facilities which could be best evaluated by community based data. Additionally the community based data can be utilized to perform direct comparisons of injury rates among communities. There are only a very few studies on injury incidence in Sri Lanka which have been done several years before But the injury occurrence is in a striking rise in Sri Lanka during the recent past and majority of the injury data are hospital based. Therefore, the present study was carried out to explore the current situation of injury occurrence in a community setting.

Authors followed the guidelines for conducting community surveys on injuries and violence given by World Health Organization. The community selected was in a semi-urban setting facilitating data collection adjacent to the Kandy city. The sample size of the study was relatively large consisting of 696 households including 3110 residents. However the analysis of some subgroups could have drawn significant results if a larger sample had been used.

Our data demonstrates that the incidence of injuries among all age groups in the study population was 17.7 per 1000 population per six months (n=55, 95% CI: 12.2-24.6). A study done by Lamawansa and Piyatilake (2008) in a rural community in Sri Lanka has revealed that the incidence of injuries was 8.5

per 100 person years for a past one year recall period. The second study exploring injury statistics was conducted by Navaratne et al. (2009) which revealed an incidence of injuries of 24.6 per 100 people in a Southern Sri Lankan population with a recall period of one month. As there are differences in operational definitions of injury, sampling methods, type of data collection tools and the analysis of data it seems difficult to compare the study results directly. A similar situation exists with the other studies conducted on injuries in other countries like India (14), Uganda (15) and Nigeria (16) as well. The results of the present study as well as the other studies may have been affected by the socio-economic factors, range of injury types (whether minor injuries included or not), influence of seasonal variation and by the probable underestimation due to recall bias. As the present study includes severe and less frequent injuries and deaths, a recall period of 6 months which enables the respondent to recall easily a major injury, was utilized in this study.

Injury prevalence in the present study was higher among males particularly in the age group of 18 to 60 years which is the highly productive age group in a country. Similarly, Lamawansa and Piyatilake (2008) has shown that majority of injuries had occurred in the age group of 25-60 age group among males while Navaratne et al. (2009) has reported majority of injuries among the age group of 20-59 years of age. The present study finding on age and sex group is comparable to a study done in India too (17). These findings may indicate that the productive male population is vulnerable to injuries as the majority is involved in occupation as they are the sole bread winners to their families facing a high economic burden. Further, these findings are in keeping with the national inpatient data as well which depicts the highest number of injury occurrence among the most active age group (18).

Falls (38.2%) were the leading cause of injury followed by road traffic crashes (29.1%) and animal bites (9.1%) according to the present study. Similarly Navaratne et al. (2009) has reported falls (26.7%) as the most common cause of injury followed by road traffic accidents (20.5%) and animal bites (16.9%) which was done in an urban setting in Sri Lanka. Similar findings were reported in a study done in India recently as well(17). Further, a study done using multiple data sources in Sri Lanka has shown that road traffic injuries has been steadily rising during the recent past.<sup>19</sup> In contrast, a Sri Lankan study done in a rural setting in 2008 has identified the animal bites (28.2%) as the commonest cause for injuries followed by falls(18.8%) and objects fallen on the victim(17.6%)(5). However, in the present study third most common cause of injury was the animal bites caused by snakes (n=2), dog(n=1) and wasp(n=1). Interestingly, although our study population belonged to a semi urban area there were no agriculture related injuries. However, in India agriculture related injuries were commonly reported until recently (17,20). These differences may suggest that the patterns of the occurrence of injuries have changed with time and geographical locality. Industrialization and commercialization taking place in Sri Lanka may have contributed to the said changes indirectly.

Majority of the injuries had occurred in the homes (38.1%) of the residents in the present study. Further, a higher proportion had occurred inside the homes (25.4%) than in the home gardens (12.7%). The second commonest place of injury occurrence was

road (29.1%) followed by work place (20.0%). Whereas Lamawansa and Piyatilake(2009) has reported more injuries occurring on the road(41.1%) than the home(34%). Therefore, in planning preventive measures this fact is significant as home injuries seems to be in an increasing trend when a rural and a semi urban settings are compared. It may be due to the rather busier life pattern and the nuclear family settings when getting urbanized putting respondents on more home injuries. Further, first aid measures for injuries in the houses, schools and work places seem to be inadequate and inappropriate and need to be strengthened. Therefore, the findings of this study warrant need for community-based health education projects focusing on pre-hospital care, life skill development and behavior change among semi-urban Sri Lankan population. Apart from health education efforts, there is a need to strengthen government supported primary health care facilities.

It is interesting to know that majority of the injuries were limb injuries (74.7%) which significantly contribute for long term disability status among people. This is also noteworthy when setting up health care facilities in order to reduce the burden of disease and disability as well as in implementing rehabilitation facilities in the country.

About 96.4% (n=53) of the reported injuries were accidental and it is noteworthy that almost all reported injuries were accidental in nature, which could have been prevented by care and protective measures. Unfortunately, a misconception in the society is that the injuries are due to fate and are unavoidable. Similarly in Sri Lanka people are influenced by the religions, cultural beliefs and etc. But it is no longer true as injuries are largely predictable and preventable (1).

In the present study, majority ((70.9%, n=39) had received allopathic treatment and only a minority 12.7% (n=7) had received traditional indigenous medical treatment-Ayurvedic medicine only. Still 21.8% (n=12) had obtained both types of treatments. Ritualistic treatments were received by 21.8% (n=12) of all participants which are not potentially harmful. These findings are similar to Lamawansa and Piyatilake (2009) which reports majority injured obtaining treatment from the local hospitals (28.2%) and tertiary care (21.2%) which predominantly offer allopathic treatment. Whereas only 11.8% of injured had obtained indigenous medical treatment. There are no other studies done in Sri Lanka on ritualistic treatment facility utilization but still the present study gives evidence that still with all the industrialization and mechanical changes undergoing in the country a significant percentage rely on some kind of ritualistic treatment as well.

Finally, the present study describes the local situation of injuries in different age groups and according to sex and it explores the various treatment seeking behaviours of the community which may be useful for development of injury surveillance and prevention. As a developing country it is worth exploring and presenting these findings in order to contribute for the pool of global knowledge of injuries which can be used for the initiative of reducing the burden of unintentional injuries (21).

Further, there are limitations of the present study such as it being a medium scale study but it was based on a probability sample. Still being a community-based survey, the present study relied on reporting by respondents although cross checking with

medical records was done whenever possible. Therefore the accuracy of respondents' answers on the occurrence of injury events or the duration of the resultant disability is debatable. Information was gathered from the respondent him/herself or from the residence housewife assuming she can recall injuries better than other members in the family.

## V. CONCLUSION

Considering the high prevalence of injuries related to road traffic accidents, fall from height and animal bite related injuries across all age groups, especially among men injury prevention interventions are needed to target different age and sex groups. These interventions should be planned according to the local epidemiology and need to focus on changing injury-related risky behaviors and practices. In addition to the health education practices, there is a need to strengthen basic health care facilities to provide appropriate first-aid treatments for different injuries and awareness programmes for the primary health care workers.

## ACKNOWLEDGMENT

Our special thanks to all study participants. Our heartiest gratitude to Dr. Andrea C. Gielen, Director, Johns Hopkins Center for Injury Research and Policy, Johns Hopkins University for her kind support provided during this work.

## REFERENCES

- [1] Injuries and violence: the facts. Geneva, Switzerland, World Health Organization, 2010.
- [2] Trauma Secretariat, Sri Lanka Ministry of Health care and Nutrition, 2013.
- [3] Guidelines for conducting community surveys on injuries and violence. Geneva, Switzerland, World Health Organization, 2004.
- [4] K.V.Navaratne, P.Fonseka, L.Rajapakshe, L.Somatunga, S.Ameratunga, R.Ivers, R.Dandona, Population-based estimates of injuries in Sri Lanka, *Inj Prev.* 2009;15:170-175
- [5] M.Lamawansa, A.Piyathilake, Incidence of physical injuries in rural community in Sri Lanka: result of the first community survey in Sri Lanka, *Indian J Community Med.* 2008; 33:238-42.
- [6] M. Eddleston, N.Udayakumara, S.Adhikari, D.de Silva, M.H.R.Sheriff, et al, The Importance of Poisoning vs. Road Traffic Injuries as a Cause of Death in Rural Sri Lanka, 2007, *PLoS ONE* 2(7): e599.
- [7] K.P.Karunadasa, C.Perera, V.Kanagaratnum, U.P.Wijerathne, I. Samarasingha, C.K.Kannangara, Burns due to Acid Assaults in Sri Lanka, *J Burn Care Res* 2010;31:781-785.
- [8] R.M.Jayatunge, Traumatic Brain Injury among the Sri Lankan Combat Veterans, *Colombo Telegraph*, 2013.
- [9] D.Thirunaaukarasu, S.Srikanth, S.E. Susiganeshkumar, P.Snidha Swapnica. Unintentional injuries: Burden and Risk factors in rural areas of Puducherry, *Indian Journal of Medical Specialities* 2013;4(2):229-233.
- [10] G.Kalaiselvana, A.R.Dongre, T.Mahalakshmy, Epidemiology of injury in rural Pondicherry, India, *J Inj Violence Res.* 2011; 3(2): 62-67.

- [11] Local Government Enhancement Sector Project, GreenTech Consultants Pvt. Ltd., Colombo, Sri Lanka, 2013.
- [12] S.K. Lwanga, S.Lemeshow, Sample size determination in health studies: a practical manual, Geneva: World Health Organization, 1991.
- [13] Department of Census and Statistics, Sri Lanka. Employed population and major groups of occupations by district, Population and housing census 2001.
- [14] N.Garg, A.A.Hyder, Road traffic injuries in India: a review of the literature, *Scand J Public Health.* 2006; 34:100-9.
- [15] O.Kobusingye, D.Guwatudde, R.Lett, Injury patterns in rural and urban Uganda, *Inj Prev.* 2001; 7:46-50.
- [16] O.A.Olawale, E.T.Owoajie, Incidence and pattern of injuries among residents of a rural area in South-Western Nigeria: a community-based study. *BMC Public Health.* 2007;17:246.
- [17] G. Kalaiselvana, A.R.Dongre, T.Mahalakshmy, Epidemiology of injury in rural Pondicherry, India, *J Inj Violence Res.* 2011; 3(2): 62-67.
- [18] Annual health bulletin1996-2002, Ministry of Health, Colombo, Sri Lanka
- [19] K.Bhalla, N.V.Navaratne, S.Shahraz, D. Bartels, J.Abraham, S. Dharmaratne. Estimating the incidence of road traffic fatalities and injuries in Sri Lanka using multiple data sources, *International Journal of Injury Control and Safety Promotion*, 2010, 1-8.
- [20] M.Varghese, D.Mohan, Occupational injuries among agricultural workers in rural Haryana, India, *Journal of Occupat Accidents.* 1990; 12:237-44.
- [21] N.N.Borse, A.A.Hyder. Call for more research on injury from the developing world: results of a bibliometric analysis, *Indian J Med Res.* 2009; 129:321-6.

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