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Consequences and Outcome of Spinal Cord injury Occurred by Bull Attack: A 10 Years Observation from Bangladesh

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Abstract

Background: Spinal Cord Injury (SCI) a sudden devastating and debilitating neurological condition that suffers a patient's lot. SCI have a consequence upon physical, psychological, domestic and social context and the incidence diverse upon socio-economic and cultural perspective. In developing countries with the profound agriculture-based economy like Bangladesh, bull attack is one of the causes of SCI and the consequence and outcome in this cultural scaffold yet to be explored.

Aim: The aim of this study was to elicit the consequence, clinical characteristics and outcome of the patient with SCI caused by bull attack. Methods: The study design was retrospective study design and conducted at Centre for the rehabilitation of the paralyzed (CRP), Dhaka-1343 in Bangladesh from January 2008 to December 2017. 72 persons with bull attack-induced spinal cord injury (BASCI) were found from the medical records. The data were recorded, compared and analyzed by Statistical package of social science (SPSS) 16 versions and Microsoft excel software 2007 version.

Results: Among 72 respondents, 30.5% of the respondents were aged between 41-50 years, 93.1% male, 43.05% illiterate, 93.1% had traumatic tetraplegia and 58.33% were farmer living in the village. The neurological level was C1-C8 in more than half of the respondents thought the attack was in lower back and extremities. During admission, ASIA-A was 43.1% and during discharge, ASIA-A was 36.1% and an average length of rehabilitation was 3 months.

Conclusion: SCI causes lifelong impairments for an individual and there is a strong association with farming, animal husbandry, literacy, and awareness. The findings can contribute to developing awareness among stakeholders in a developing country like Bangladesh.

Keywords: Consequences; Functional outcome; Spinal Cord Injury (SCI); Bull attack

Introduction

Bangladesh is a developing country of South-Asia region with a population of about 160 million [1,2]. The majority of the populations live in villages and more than one third of persons with disability caused by numerous causes live in rural area [3]. The country has attained compelling achievement in health sector [4] and prevention, management and comprehensive rehabilitation for persons with disabilities are one of the objectives of strategic plan to achieve the milestone of sustainable development. Spinal cord injury (SCI) is one of the causes of physical disability in Bangladesh with 5% prevalence [5]. Spinal cord injuries from traumatic or non-traumatic both have profound impact on physical, mental, domestic and social life of an individual [2,6]. Globally a trend has been observed that most of the traumatic spinal cord injuries occurred by fall from height (FFH) or either road traffic accident. There are some variations in the cause of SCI in respect of area, culture and so on [1,2,6].

Developing country like Bangladesh livestock rearing is a part of mixed farming system. It has a direct impact of predominant source on income generation and poverty alleviation [7]. Among livestock animals, bulls are the most dangerous one and the result of bull attacks is associated with severe injuries and high mortality [8]. Bull attack frequently reported in different countries, where bulls are used for sporting event or in the place where farming and livestock rearing practiced [9]. In rural locations in an agriculture based country, the animal related injuries can occur because there are multiple use of domestic animals [10], thus they are common cause of morbidity and mortality in this rural settings [11].

Bull attack was found to be as one the causes of SCI in Bangladesh. Rahman and co-authors found in five years observation bull attack is associate with SCI about 2% (n=40) [1,2]. A study in USA, Scott and coauthors was found that from 145 patients with injuries caused by large animals, 32% were caused by bulls. Here, torso trauma has been found associated with bull attack [12]. Research reveals, in western countries injuries caused by bulls/buffalo varies from 375 to 740 in 100000 people every year [13], although the pattern of injury seems to be varied. In the Latin countries, lower extremity injuries found to be more common [14]. There is no available study on prevalence and functional outcome followed by bull attack in Bangladesh and south-east Asia; moreover threat from animal has proven to create significant disability with medical and social impairments [15].

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SCI cause life-long sufferings for an individual. Bull attack as a cause of spinal cord injury might be occurred due to lack of proper knowledge of animal husbandry or unsafe mode of animal handling. The mechanism and functional outcome needs to be estimated. The findings of this observational study may add in the way of developing awareness among stakeholders regarding pattern of injury, consequences, outcome and complications of SCI in a specific cultural scaffold in a developing country like Bangladesh.

Research Methodology

Ethical considerations

The researchers were duly concern regarding the ethical aspects of the study and formal permission was taken from the Ethical review committee of Centre for the rehabilitation of the paralyzed (CRP), Savar, Dhaka, Bangladesh, for conducting this study. All information has been obtained from medical record from admission to discharge and was kept secured. Confidentiality of the person and the information was maintained and observed throughout the study.

Study design

This retrospective study was conducted at CRP, Savar, Dhaka, Bangladesh from January 2008 to December 2017 among the patients of SCI with bull attack injury. Data were collected from the medical records kept in secure patient data management software. The medical records from admission to discharge have been taken to find out the mechanism, prevalence, consequence and outcome. 72 patients with SCI found with bull attack-induced spinal cord injury (BASCI). During admission an initial neurologic deficit was assessed according to the ASIA scale [16] done by medical officer with evaluation of right and left motor and sensory levels, neurological function, skeletal level and after completion of rehabilitation program during discharge time again ASIA done by physiotherapist and medical professionals as because of compare of their neurological extent as well as functional outcome. Patient assessed according to ASIA impairment scale classes A, B, C and D [17]. The demographic and clinical characteristics of the patients were recorded in admission and discharge, compared pre-rehabilitation & post-rehabilitation state and analyzed through frequency distribution, correlation with other common mechanisms of SCI and presented accordingly.

Setting and participants

CRP is a well-recognized, well-renowned rehabilitation center especially for SCI patients in Bangladesh. Data were collected from 10 years medical records of the hospital. The inclusion criteria were patients admitted with history of bull attack. CRP is known as mother organization in Bangladesh for rehabilitation of the SCI patients. CRP receives referrals from different hospitals and from all over Bangladesh [2]. A recent study reported that approximately 390 patients per annum with injury to the spinal cord were admitted to the CRP [1].

Data collection procedure

Analysis

After obtaining the data, patients with bull attack history has been enlisted. Their demographic data has been obtained and pre and post rehabilitation neurological and functional outcome has been recorded. Alongside the outcome, the length of rehabilitation has been recorded. All the data has been analyzed through frequency distribution and made compare in pre & post rehabilitation outcome with correlation with other mechanism of injury. The data was analyzed by Statistical package of social science (SPSS) 16 versions and Microsoft excel software 2007 version.

Results

Demographics

Among 72 respondents 93.1% (n=67) were male and 6.9% (n=5) were female. Most of the patients were in their 4th decade of their life which consisted 30.5%, followed by 26.4% in between 31-40 years and 18.1% in between 51-60. 67 of the respondent (93.1%) were diagnosed as traumatic tetraplegia and 5 respondents were diagnosed as traumatic paraplegia. Most of the participant 43.05% (31) was illiterate and most of them 58.33% (42) were farmer (Table 1).

It was observed that from January 2008 to December 2017 maximum bull attack injured patients were 13.88% (10) admitted in 2010 and minimum bull attack injured patients 2.77% (2) were in 2017 where as 11.10% (8) participant injured respectively in 2008, 2009 and 2015. Among the 72 participants 12.5% (9) were injured respectively in 2012 and 2013 and 9.72% (7) participants injured respectively in 2011 and 2014 and 5.55% (4) participants injured by bull attack in 2016 (Figure 1).

Neurological and functional outcome

Out of 72 respondents, during admission 43.1% (31) had ASIA-A which declined during discharge to 36.1% (26). Also, during admission 12.5% (9) had ASIA-B and after rehabilitation management, during discharge it progressed to 6.9% (5). 8.3% (6) of patients had been diagnosed as ASIA-C during admission and during discharge 12.5% (9). 13.9% (10) of patient with bull attack had ASIA-D in admission and during discharge 16.7% (12) have ASIA-D. During admission ASIA-E was 0% but in discharge 5.6% (4) were normal ASIA-E (Table 2).

Neurological level of injury

91.1% (51) of the participants had neurological level C1-C8 during admission and during discharge 85.7% (48) had neurological level C1-C8. In thoracic region, 7.1% (4) had neurological level T1-T12 during admission and during discharge. No patient admitted with neurological level of L1-L5 whereas discharged 3.6% (2) as a consequence of progression of cervical and thoracic level. During admission 1.8% (1) was intact neurological level and during discharge 3.6% (2) were intact neurological level (Table 3).

Duration of rehabilitation

The patients had average length of rehabilitation for 90 days; the maximum length of stay was 100 days and minimum 80 days. This is a preplanned predefined time length for patients in CRP since 1990 [18-22]. Rehabilitation service included physiotherapy, occupational therapy, speech & language therapy, prosthetics and orthotics service, social welfare, counseling psychology, vocational training along with medical and nursing care.

Discussion

The bulls which can easily become raged, bull attack can be happened by its horn either accidentally or as a result of an attack [9] the mechanism of injury can be determined through history; where patient's/victim's entire body weight may be lifted up. Bulls pick up the victim through upward and lateral angulations following an arc [18]. When the animal tries to disengage its horn, the patient's weight additionally acting in the opposite direction for detachment and injury occurs. Injury depends on the impact of attack which

Demographic variables	Frequency	Percentage
Age		
<10 y	1	1.4
11-20 y	4	5.5
21-30	6	8.3
31-40	19	26.4
41-50	22	30.5
51-60	13	18.1
61-70	7	9.7
Sex		
Male	67	93.1
Female	5	6.9
Diagnosis		
TT	67	93.1
TP	5	6.9
Education		
Primary	19	26.4
SSC	2	2.77
HSC	1	1.38
Illiterate	31	43.05
Unknown	19	26.4
Occupation		
Businessman	8	11.11
Driver	2	2.77
Farmer	42	58.33
Housewife	3	4.16
Student	1	1.38
Unknown	16	22.22

*As we collect the data from medical record and from the data management software where no information have been found about education 26.4% and occupation 22.22%.

*TT: Traumatic tetraplegia.

*TP: Traumatic paraplegia.

*SSC: Secondary school certificate.

*HSC: Higher secondary certificate.

Table 1: Distribution of demographic variables of the respondents (n=72).

Traits	ASIA on admission		ASIA on discharge	
	Frequency	Percent	Frequency	Percent
A	31	43.1	26	36.1
B	9	12.5	5	6.9
C	6	8.3	9	12.5
D	10	13.9	12	16.7
E	0	0	4	5.6

*Admission and discharge ASIA missing for 16 participants.

Table 2: ASIA during admission and discharge (n=72).

Traits	Neurological level on admission		Neurological level on discharge	
	Frequency	Percent	Frequency	Percent
C1-C8	51	91.1	48	85.7
T1-T12	4	7.1	4	7.1
L1-L5	-	-	2	3.6
Intact	1	1.8	2	3.6

*Admission and discharge neurological level missing for 16 participants

Table 3: Neurological level on admission and discharge (n=72).

may cause very severe or less severe damage. Seventy two patients admitted in CRP with bull attack induced injury in between January 2008 to December 2017 where age, gender, educational level, nature of work and diagnosis were taking into consideration as demographic variables. Male predominance previously reported in both local [1,2] and global [19-22] studies were also found in this research where 93.1% (n=67) were male and 6.9% (n=5) were female. Age distribution in this research shows most of the participant in their 4th decade of life where Marino et al. found the mean age to be 41 [19]. Most of the bull attack participants are diagnosed as traumatic tetra (TT) 93.1% (67). We found main occupation as farmer 42 (58.33%) where our countries main occupation agriculture dependent. Bull attack was major in

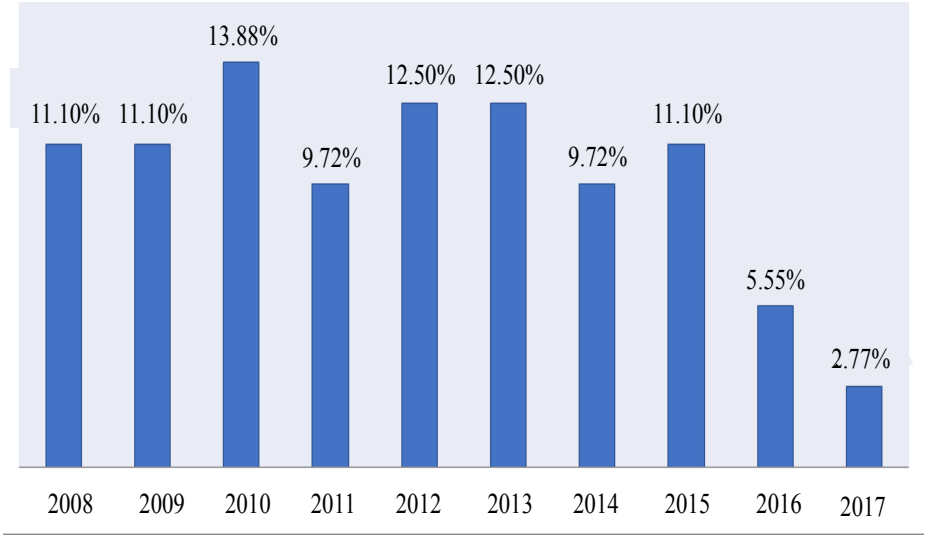

Figure 1: Yearly distribution SCI caused by bull attack (n=72).

2010 compare with yearly distribution now bull attack is decreasing. From the recording during admission A were 43.1% (31) and during discharge A were 36.1% (26) whereas during admission E was nil and during discharge E were 5.6% (4) From this evidence we can easily understand that progress of bull attack after rehabilitation was effective. Most of the participants during admission and discharge neurological level C1-C8 were 91.1% (51) and 85.7% (48) respectively. From this evident most prominent neurological level for bull attack injury was C1-C8. A recent five years epidemiological study [2] shows that bull attack induced injury was fifth major cause which was 1.8% that fairly new phenomenon and the main cause was fall from height (FFH) which was 45.5% where our study reveal that highest bull attack injury happened in the year 2010 (13.88%) and lowest was 2017 (2.77%).

Conclusion

SCI cause lifelong sufferings for an individual. Bull attack as a cause of spinal cord injury might be occurred due to lack of proper knowledge of animal husbandry or unsafe mode of animal handling. The impact usually happens in lower extremity and back but injury occurs in cervical region with a consequence to tetraplegia. The outcome is usually better than fall from height and shallow diving in 3 months rehabilitation management. The findings may add in the way of developing awareness among stakeholders regarding pattern of injury, consequences, outcome and complications of SCI in a country like Bangladesh.

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Conflict of Interest

Authors having no conflict of interest

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