



Faculty of Medicine
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**“A CASESERIES OFPEDIATRIC SPINAL CORD INJURY
PATIENTS ATTENDINGAT CRP”**

By

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DECLARATION

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also state that for any publication, presentation or dissemination of information of the study. I would be bound to take written consent of my supervisor and head, department of physiotherapy, BHPI.

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ACRONYMS

BHPI	Bangladesh Health Professions Institute
BMRC	Bangladesh Medical Research Council
CRP	Center for the Rehabilitation of the Paralyzed
IRB	Institutional Review Board
SCI	Spinal Cord Injury
WHO	World health organization

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ABSTARCT

Introduction: Spinal cord injury (SCI) is a demolishing neurological disorder which has an influence on human from different perspectives such as physical, psychological and socioeconomic perspectives. **Aim of the study:** Its aim was find out the demography, causative factor and medical histories of rare cases of pediatric spinal cord injury patients. **Objective:** To identify the participants' demographics, perceptions, and evaluations and possible information that is associated with pediatric spinal cord injury. **Method:** This study was a mixed-methods type of study. Participants' demographics, perceptions, and evaluations were given with descriptive statistics in the quantitative analysis. In the qualitative section, an open structured interview was recorded for a maximum of 25 minutes to get the best possible input from the participants. The study populations were the patients with spinal cord injury and who were less than 16 years and who were admitted at CRP spinal cord injury unit, Saver, Dhaka. The 5 samples were selected by convenience sampling method. **Result:** The study was conducted with 5 participants all of them were student. Among the total participant 80 % (n=4) was living rural area and 20% (n=1) were living sub rural area. Most of them were 10 to 15 years and most of participant were paraplegic. In this study it was found that most of the patients 80% (n=4) were incomplete B and 20% were complete A, according to impairment grading in ASIA scale. According to that study it were found that among the 5 participants of SCI pediatrics patient most of the participants were injury in thoracic level 60% (n = 3), lumber level were 20% (n=1) and rest 20% (n=1) were cervical level. According to that study it were also originated that 60% (n=3) were traumatic cause and 40% (n=2) were non traumatic causes among the total 5 participants. The study also demonstrated that within traumatic causes fall from height was the major causes. The patient who was financially poor comparatively they were more depressive about their life.

Key words: Spinal cord injury, pediatrics, biographic histories

1.1 Background:

Spinal cord injury (SCI) is a neurological disorder which has an influence on human from different perspectives such as physical, psychological and socio-economic perspectives. It is a major life event may either traumatic or non traumatic that leads to serious physical disability which is permanent and causes other secondary medical problems (Al-owesie et al.,2016). Spinal cord injury has been defined as an acute traumatic injury of the spinal cord, including damage to the caudal equina and conus medullaris, resulting in motor or sensory deficit, and neurogenic impairment bladder or bowel (Chamberlain et al., 12015).

Spinal cord disorders relates to pathological damage of the spinal cord, typically because of tumor, infection, and inflammatory or vascular conditions (Galvin et al.,2013). It is one of the most serious medical conditions that causes functional, psychological and socioeconomic disorder and also lead to lifelong disability. The amount of disability associated with completeness as well as the level of injury (Sezer et al., 2015). The causes of SCI may differ from person to person due to different age, sex, race and socio cultural activities (Hoque et al., 2012).

The most frequent cause of traumatic spinal cord injury is motor vehicle accidents. Spinal cord injuries can occur for a variety of reasons. Though the most common causes of SCI are related to the same researcher, the most common causes are automobile crashes (31.5%) and falls (25.3%), followed by gunshot wounds (10.4%), motorcycle crashes (6.8%),diving incidents (4.7%), and medical/surgical complications (4.3%). Automobile crashes were the first leading cause of SCI in children, while falls were the second leading cause. Males suffered more SCIs than females due to gunshot wounds, motorbike accidents, and diving (Chen et al., 2013).

The annual incidence of spinal cord injury 12.1–57.8 cases per million worldwide (Munce et al., 2013).A number of people living with SCI in the US are approximately 270,000. Every year, an estimated 11,000 SCIs occur in the U.S and in Europe, the incidence is from 10.4 per million per year to 29.7 per million per year (Moghimian et al., 2015). The highest prevalence of SCI is 906 per million in the United States (Lim et al., 2017). In Asia, the incidence rates of SCI range from 12.06 - 61.6 per million,

while the average age range of affected persons is 26.8 - 56.6 years (Ning et al., 2012). In the United States, the annual incidence of traumatic SCI is 40 cases per million or 12000 new cases each year. The annual rate of spinal cord injury is 1.5-2 per 100,000 people. Every year, roughly 1200 persons in the United Kingdom are paralyzed due to a spinal cord injury. Every year, about 20000 new cases of spinal cord injury are reported in India(Singh et al., 2016).

Spinal cord injury is also associated with high risk of premature mortality. Most of the evidence shows that the mortality after SCI has historically focused on biographic and injury characteristics such as age, sex, race, cause of injury, level of injury, neurologic completeness of injury, ventilator dependency (Krause et al., 2011).

Over the past three decades while clinical attention has increasingly focused on the prevention of secondary complications after that acute mortality rates of spinal cord injury patients have fallen. It has been proved that the people who have spinal cord injury are highly capable to medical conditions and secondary chronic conditions, such as pressure sores, urinary tract infections, diabetes, cardiovascular disease, obesity, osteoporosis and arthritis. The development of SCI treatment units, including well-trained, specialized teams for rehabilitation, and regular follow-up can decrease the mortality rate of people with spinal cord injury (Razzak et al., 2011).

Pediatric spinal cord injuries are more common in low and middle income countries compared to high income countries. Pakistan is one such country where data regarding pediatric injuries is scarce. There is not a single study conducted in Pakistan which reports SCI in pediatric population. Although traumatic SCI is common in young age, yet previously conducted research studies in Pakistan have not focused on this different young age group. Epidemiological characteristics and mechanism of injuries in children with SCI were different from those reported in adult population. (Piatt, 2015).

Maturity of the spine and spine-supporting structures is an important variable distinguishing spinal cord injuries in children from those in adults. The 47 children with traumatic spinal cord injury averaged 6.9 years of age and included 20 girls (43%). The etiology of the pediatric injuries differed from that of adult injuries in that falls were the most common causative factor (38%) followed by automobile-related injuries (20%). Ten children (21.3%) had spinal cord injury without radiographic

abnormality (SCIWORA), whereas 27 (57%) had evidence of neurological injury. Complete neurological injury was seen in 19% of all traumatic pediatric spinal cord injuries and in 40% of those with SCIWORA. The most frequent level of spinal injury was C-2 (27%, 15 cases) followed by T-10 (13%, seven). Cassese very young children had a significant difference in level of injury, requirement for surgical stability, and sex distribution compared to 4- to 12-year-old children (Ruge et al., 2013). The incidence of pediatric SCI in the United States, with rates ranging from 6 to 116.7 per million populations. It is also found that annual incidence rate of 19.9 per million children (ages 0 to 18 years) in the United States (Rozzelle et al., 2017).

The physical and mental implications of spinal cord damage (SCI) are devastating because it is not as frequent as many other injuries. After a spinal cord injury, only a small percentage of persons get complete neurological recovery. Traumatic spinal cord injury (SCI) in the juvenile population poses different obstacles than SCI in the adult population since children and adolescents are still developing. Despite the fact that the etiology of damage differs between pediatric and adult populations (Sunders et al., 2015).

It can also lead to long-term disability due to socioeconomic inequity. The percentage of people who are disabled as a result of their completeness Spinal cord damage is one of the most significant medical disorders, causing functional, psychological, and, depending on the severity of the injury, physical impairment (Sezer et al., 2015)

Significant differences in the annual incidence rate of pediatric SCI were found to exist between patient populations stratified by race and sex. African Americans (1.53 cases/100,000 children) exhibit a significantly higher rate of pediatric SCI than Native Americans (1.00), Hispanics (0.87), and Asians (0.36), whereas Asians show a significantly lower incidence than all other races. Also, boys (2.79) are more than twice as likely to experience SCI as girls (1.15). The overall incidence of pediatric SCI in the United States is 1.99 cases per 100,000 children. From these data, it is estimated that 1455 children are admitted to US hospitals each year for treatment of SCI. The etiology of pediatric SCI was also investigated, and the major causative factors were identified: motor vehicle accident (56%), accidental fall (14%), firearm injury (9%), and sports injury (7%). Of those children injured in a motor vehicle accident, 67.7% (n = 107) were reported as not wearing a seatbelt.

The role of alcohol and drugs was also investigated and found to be involved in 30% (n = 82) of all pediatric SCI cases. Children's cervical spine injuries (CSIs) can be fatal or result in life-altering neurological impairments. Despite the fact that they are uncommon, health care workers frequently check children for CSI caused by blunt trauma. It's critical to think about CSI patterns in children and how they relate to mechanisms, treatments, and neurological consequences. Previous research has found that overall death rates for CSI in children can be as high as 27%, with 66% of those who survive having permanent neurologist deficits. Neurological impairments (21%) and death (7%) were less common (Vitale et al., 2006).

Spinal cord injury is uncommon in the pediatric population with a lifelong impact for the patient and family. Knowledge of spine embryology, mechanisms of injury that lead to specific injuries, appropriate utilization of radiographic imaging based on suspected injury, prehospital and hospital management of various spinal cord injuries is essential for providers attending to traumatically injured patients. In addition to patients who present with soft tissue and bony injuries diagnosed with clinical examination and confirmed with computed tomography or magnetic resonance imaging, it is important to note that the pediatric population is at a higher risk for spinal cord injury without radiographic abnormality than the adult population. Patients who survive the acute phase of injury face long-term rehabilitation and have an increased risk of depression and mortality. Understanding the long-term sequelae of spinal cord injuries is also an essential management component of traumatically injured children. A program that provides long-term rehabilitation, psychosocial and spiritual support, and adaptive environmental supports gives patients and their families the best opportunity for long-term recovery (Lamely et al., 2015).

The risk of morbidity and mortality is high in spinal cord injury. Mortality risk is highest in the first year after injury and remains high compared to the general population. People with spinal cord injury are 2 to 5 times more likely to die prematurely than people without SCI. This life threatening condition has various epidemiological studies that have been carried out in different part of the world. Worldwide incidence of SCI varies from 9.2 to 56.1 per million (Mathur et al., 2015). Among worldwide incidence of spinal cord injury, males are most common than females, children also included (Nas et al., 2015).

According to WHO estimate, males are most at risk in young adulthood between 20-29 years and older age greater than 70 years. On the other hand, females are most at risk in adolescence between 15-19 years and older age greater than 60 years. Studies report male-to-female ratios of at least 2:1 among adults, sometimes much higher (WHO, 2013)

1.2 Rationale:

Now a days Spinal cord Injury is most commonly occurring disabling condition in all developing and developed countries in the world and it will increase day by day due to lack of awareness. As pediatric spinal cord injuries are not most familiar word in Bangladesh but it is increasing day by day. Though there are many scholarly article published regarding pediatric spinal cord injury in different countries but there have not been found any research in Bangladesh about the rare cases of pediatric spinal cord injury. Injuries that are affecting the spinal cord and complicated by physical damage are an important health problem in Bangladesh as they carry a high rate of morbidity and mortality. Biographic histories of spinal cord injury are important to know as Bangladesh is a developing country and trying to develop health care system. It generates exact information considering details about which causes, age, gender, diagnosis, residential area, educational level and economic level were responsible for those rare cases of injury. It also helps to raise awareness among the population and will help to get in formations about spinal cord injury. And indicates that the spinal cord injury patients who need a specialized and comprehensive rehabilitation services to continue their activities of daily living in the community. In our country we are not conscious about spinal cord injury. Spinal cord injury can destroy of one's life and his whole family. The patient can survive with full struggle. Life is so much challenging to him or her. In some area people think that spinal cord injury is the curse from Allah. It is just an accident which destroys the whole life. So it is very important to aware about the incidence so that we can prevent the injury. As the present child will be the leader in the next generation so we should take steps to reduce the risk of pediatric spinal cord injury as well as all age's people because it alter total life of the affected persons. In SCI patient's rehabilitation program or long term management is major treatment, where physiotherapy is essential. So the study enhances the knowledge about SCI injury in teenagers as well the frequency mostly risky age groups and its nature such as type, extent etc. The preventative measure may help reduce the risk of pediatric spinal cord injury and as well as spinal cord injury at any age. As if we concern about fall from height, road traffic accident, motorbike injury rate may reduce. If people from all corner of the Bangladesh are aware about the cause of SCI then it can help to lowering the rate of injury.

1.3 Research question:

What are the demography, causative factor and medical histories of pediatric spinal cord injury patients?

1.4 Objective:

a. General objective

To find out the demographic profile, and causative factor and related medical histories of pediatric SCI patients.

b. Specific objective

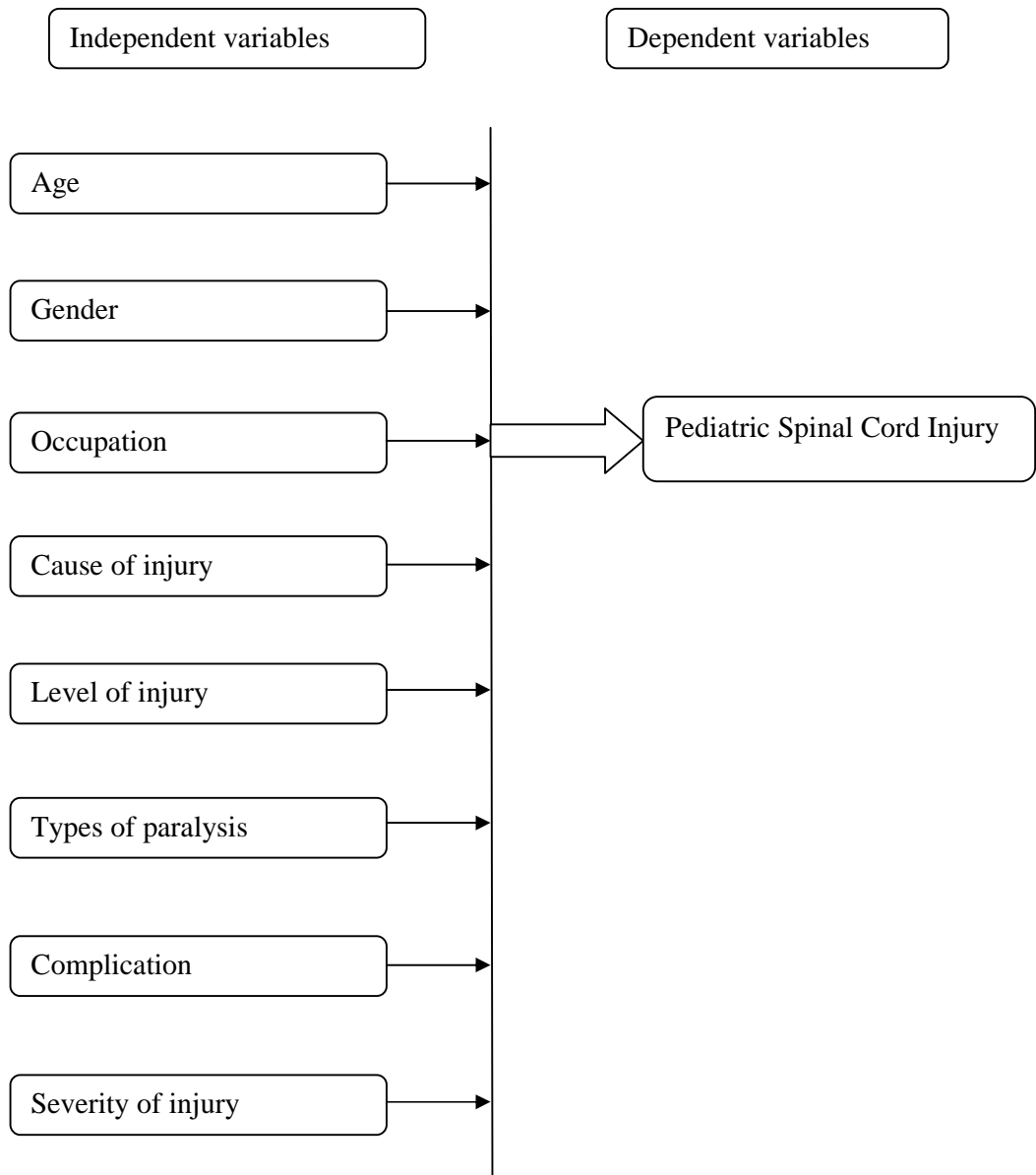
To explore the socio demography (age, gender, education, living area).

To explore the causative factor of SCI injury.

To find out the skeletal & neurological level of SCI injury.

To explore the preventive measure to spinal cord spinal injury.

1.5 Conceptual framework:



1.6 Operational definition:

Paralysis: Injury or disease to the nervous system can affect the ability to move a particular part of the body. This reduced motor ability is called paralysis.

Neurological level: Up to the level where both sensory and motor function is remains intact.

Paraplegia: The term paraplegia means impairment of motor and/ or sensory function in the thoracic, lumbar and sacral segments of the spinal cord which is secondary to the damage of neural elements within the spinal canal. Paralysis occurs of lower portion of the body and of both legs.

Tetraplegia: Injury of the spinal cord in the cervical region, with associated loss of muscle strength in all 4 extremities is called tetraplegia. Paralysis of both legs and both arms, it is also called quadriplegia.

Complete lesion: Absence of sensory and motor functions in the lowest sacral segments is called complete lesion.

Incomplete lesion: An incomplete lesion is the term used to describe partial damage to the spinal cord. With an incomplete lesion, some sensory and/or motor function remains at the lowest sacral segments. Including the lowest sacral segments preservation of sensory or motor function below the level of injury is called incomplete lesion.

The central nervous system (CNS), which extends caudally and is protected by the bone components of the vertebral column, includes the spinal cord. The dura mater, arachnoids, and innermost pia mater are the three CNS membranes that protect it. Only the spinal cord takes up the upper two-thirds of the vertebral column in most adult animals. The growth of the bones that make up the vertebral column is proportionate to the size of the canal. The speed of the brain is faster than the speed of the spinal cord. The location of the rostrocaudal position of the two of the four parts of the spinal cord is cervical, thoracic, lumbar, and sacral. These are distinguished by an upper or cervical and a lower or lumbar segment (Nagoshi et al., 2015).

A symptom of spinal cord damage is the loss of function. Injury to the spinal cord causes impairment in function. Severe headaches, backaches, tingling or loss of sensation in the hands, fingers, feet, or toes, neck pain or pressure, partial or complete loss of control over any part of the body, impaired breathing after an injury, urinary or bowel incontinence or retention, difficulty with balance and walking, unusual lumps on the head or spine (Medtronic, 2013).

Spinal cord damage is a medically complex and life-altering condition (SCI). The death rates of this illness have historically, and continue to be related with high-income countries, and spinal cord injury can be considered as a productive and successful personal and social challenge. This shift represents sound medical practice, implying that people can recover, live, and improve following an accident. People with spinal cord injuries can now expect not only a longer life, but also a fuller and more productive life, as compared to past generations (WHO, 2013).

SCI most commonly affects younger age groups, with a male majority. Road traffic accidents are the most common traumatic cause, followed by sports accidents and gunshot wounds. Non-traumatic causes include infections and vascular problems. The frequency and prevalence of SCI varies by area. The majority of systematic evaluations have been conducted in the United States, Canada, and Australia, with only a handful from Asia, making it impossible to estimate global figures. The annual incidence ranges from 12 to more than 65 cases per million. The first peak occurs in young men aged 15 to 29, and the second peak occurs in older individuals. Injury

occurs at an average age of 40 years, with incomplete tetraplegia being the most prevalent, followed by total paraplegia, complete tetraplegia, and incomplete paraplegia (Hamid et al., 2018).

Compared to adults, spine and spinal cord injuries are rare in children, particularly in young children, due to both anatomical differences and the causes of the injury. The main mechanisms of traumatic spinal cord injuries are motor vehicular accidents (41.9%), falls (23.0%), violence (16.8%), and sports (10.0%), which affect children under 15 less often: vehicular accidents (36.7%), sports (24.1%), violence (23.4%), and falls (8.0%). Several anatomical differences affect the pediatric spine. The head of a young child is relatively larger relative to body mass than that of adults and heavy on the cervical spine. The neck muscles are still underdeveloped, which means that the fulcrum of movement is higher in the spine. At birth, the spine is fully developed with bone, cartilage, and fair ligamentous stability. A young child's spine is also very flexible, with pliable bones and ligaments, so fractures of the spine are exceedingly rare. However, this increased mobility is not always a positive feature. The transfer of energy that distorts the spine may not compromise the structural integrity of the bones and ligaments of the spine, but it can still lead to significant spinal cord injury. This phenomenon of spinal cord injury without radiographic abnormalities (SCIWORA) is more common in children than adults (Vogel et al., 2014).

There are two forms of spinal cord injuries: complete and incomplete. In a complete injury, a person loses all ability to feel and move voluntarily below the neurological level of the injury; yet, in an incomplete injury, there is some functioning below the level of the lesion. Complete spinal cord injuries result in complete loss of function below the level of injury, whereas incomplete spinal cord injuries result in sensation and feeling below the level of injury. Incomplete injuries, the manner the spinal cord has been destroyed is highly individual and depends on the level and degree of function (Kang et al., 2018).

Traumatic spinal cord injury (TSCI) is one of the most serious injuries, resulting in paralysis, sensory loss, and bladder and bowel problems. Preventative strategies and clinical care planning rely heavily on epidemiological knowledge. The goal of epidemiological characteristics of TSCI in Asia is to promote prevention and raise

awareness of the disease. As a result, we raise social and global awareness regarding spinal cord injury (Ning et al., 2012).

Whether complete or incomplete, the treatment and rehabilitation period for a spinal cord injury is long, expensive, and tiresome. Because SCI rehabilitation is a lengthy procedure, it necessitates the patient's and relatives' patience and motivation. Early rehabilitation is critical to avoid joint contractures and loss of muscular strength, maintain bone density, and preserve proper respiratory and digestive system function (Nas et al., 2015).

The cost of managing a spinal cord injury in the short and long term is significant for both the individual and society, owing to its life-long burden and continual medical and auxiliary treatment. In people with SCI, ongoing problems and conditions such as frequent hospitalization, pressure ulcers, autonomic dysreflexia, bladder and bowel dysfunction, pulmonary health complications, spasticity, circulatory problems, sexual problems, chronic pain, chronic fatigue, and psychological morbidity are known to challenge and degrade QOL9(Guest et al., 2015).

In terms of its impact on a person's physical, emotional, familial, and social lives, spinal cord injury is undeniably debilitating and tragic. Injury to the spinal cord caused by any pathology is today recognized a morbid condition as well as a threat to both personal and national economies, due to its devastating influence on a person's entire quality of life and increasing incidence. Spinal cord injury is a disabling ailment that can also lead to a range of consequences that can shorten the patient's life by drastically increasing treatment costs and rushing the disease process, both of which are linked to early mortality. Spinal cord injury is becoming more common around the world, with an annual incidence rate of 15 to 40 per million, with a male predominance and a higher prevalence in low socio-economic societies. The causes range from traumatic in most cases, such as motor vehicle accidents, to gunshot injury, and physical violence, but non-traumatic causes, such as spinal tuberculosis (TB), are also to blame(Quadir et al., 2017).

The common principal end-point of the trial on treatment of traumatic spinal cord injury (SCI) is the degree of impairment. Motor function and pin-prick and light-touch sensory function are widely used which is allowed by The American Spinal Injury Association (ASIA) (Furan et al., 2011)

Globally, the incidence of SCI is estimated to be 40 to 80 new cases per million people per year. This indicates that between 250 000 and 500 000 persons are harmed in their spinal cord each year (International perspective on spinal cord injury (WHO, 2013).

According to a study on SCI conducted in Bangladesh, 60 percent of those with traumatic spinal cord lesions were paraplegics and 40% were tetraplegic. 84 percent of non-traumatic spinal cord lesions cases were paraplegic, whereas 16 percent were tetraplegic. The ratio of males to females was 7.5:10 (Hoque et al., 2012).

Pediatric cervical spinal cord injury prevalence increased with age, with teenagers and young adults accounting for almost 80% of all cases. The average age of total PCSI admissions is 15.86 years,. However, the mortality rate was higher among younger patients, with a 10.83 percent mortality rate in the toddler. Female admissions with PCSI declined with age, dropping from 45 percent in the youngest group to 30 percent the oldest. The proportion of Caucasians climbed as people got older, with age, the percentage of hospitalizations covered by Medicaid fell, whereas the percentage covered by private cover grew (Shin et al., 2016).

SCIs in people under the age of 15 account for about 3–5% of all SCIs in the United States each year. From 1997 to 2000, the incidence of SCI in children and adolescents aged 18 and under was estimated to be 1.99 cases per 100 000 children and adolescents. During puberty, males are more likely than females to be afflicted; however, as the age at injury drops, the male preponderance fades, and by 3 years of age, the number of females with SCIs matches that of males. Approximately two-thirds of children who are wounded before the age of 12 are paraplegic, and another two-thirds have full lesions. Paraplegia affects about half of teenagers, whereas full lesions affect the other half (Vogel et al., 2012).

There appeared to be two unique processes that influenced younger children and adolescents when it came to harm mechanisms. Younger children were more likely to be harmed in motor vehicle accidents (MVAs), whereas teenagers were more likely to be hurt while participating in sports. According to another survey, motor vehicle accidents accounted for 52% of injuries, followed by sports injuries (27%), of which 29% were related to football. For 68 percent of patients, the level of injury was C1 to C4, for 25% it was C5 to C7, and for 7% it was both. The fatality rate in this series

was 18.5 percent, and it mostly happened to younger children (mean age 5 years). It was almost always caused by a motor vehicle accident (95 percent), and it was most often linked to an upper cervical spine injury (74 percent). Regarding the mechanism of injury, there appeared to be two distinct mechanisms that affected younger children and adolescents. Motor vehicle accidents (MVA) usually affected younger children whereas adolescents were commonly injured during sporting. Scoliosis following SCI in children is a common entity especially when the neurological insult occurs at a young age. Another study evaluated that scoliosis developed more frequently (23%) in pre-teens (< 12 years of age) than in adults (5%)(Parent et al., 2011).

Although pediatric cervical spine injuries (PCSI) constitute approximately 1% to 2% of all pediatric trauma PCSI is the majority of all vertebral injuries in pediatric patients, accounting for 60% to 80%. In contrast, adult cervical spine injury constitutes only about 15% to 45% of adult vertebral injuries. Over the past decade, the overall prevalence of traumatic PCSI was 2.07%, and the mortality rate was 4.87%. Most frequent cause of PCSI was transportation accidents, accounting for 57.51%. Upper cervical spine injury (C1–C4), cervical fracture with spinal cord injury, spinal cord injury without radio graphic abnormality (SCIWORA), and dislocation showed a decreasing trend with age(Shin et al., 2016).

The total prevalence of traumatic PCSI was 2.07% during the last decade, with mortality PCSI the average age of TSCI patients was 45.6, 13.8 years, with a male/female ratio of 4.33:1, and 94.2 percent (522 patients) of all TSCI patients were married. The most common reason for a hospital visit was a fall, which included both low and high falls (10.8 percent and 50.9 percent, respectively). MVCs were the second reason (21.8 percent). The cervical spinal cord was the most prevalent damage site, accounting for roughly 54% of all injuries. The length of stay in the hospital varied from 1 to 219 days (mean: 28.3 days). Complete tetraplegia, incomplete tetraplegia, complete paraplegia, and incomplete paraplegia accounted for 17.1%, 37.8%, 22.2 percent, and 22.9 percent of the total(Ning et al., 2016).

Between 1990 and 2016, the incidence and prevalence of SCI did not vary appreciably in terms of age-standardized incidence and prevalence. TBI and SCI had high age-standardized incidence and prevalence in Central Europe, Eastern Europe, and Central Asia, while SCI had high incidence and prevalence in North America and

Western Europe. Improved efforts to reduce the causes of SCI and TBI (e.g., fall-prevention strategies, reducing alcohol overuse, and improving road safety, all of which could help to prevent injuries or reduce injury severity) as well as improved access to and quality of medical and social care are required to address the global burden of these conditions (James et al.,2019).

The global incidence of SCI is 10.4 and 83 per million per year, with a mean age of 33 years, a male to female ratio of 3.8:1, with one-third of patients globally being tetraplegic (Wyndaele et al., 2018). Study has found that men are more vulnerable than women in traumatic spinal cord injury, and the primary causes are motor vehicle collisions and falls. In Asia, the incidence rates of SCI range from 12.06 to 61.6 per million, with an average age of 26.8 to 56.6 years (Ning et al., 2012). Males are more 83% afflicted than females in CRP, Bangladesh, with 92 % coming from rural areas and 8% from urban areas. The majority of patients had paraplegia (56%), cervical lesion (44%), thoracic lesion (27%), and lumber lesion (29%) (Islam et al., 2011). Just under half of people with SCI who participated in this study engaged in some sporting activity each week, the majority of whom (78%) preferred individual over team sports. Over half of the participants were unable to continue with write. Sport due to their injury or lack of opportunity, and 74.6% indicated that accessing information about sports participation post-SCI was difficult. In line with previous studies (Brewer et al., 2017).

This study showed that athletic identity in people with SCI is higher for males than for females. For both males and females, those who engaged in more hours of sports participation per week had higher levels of athletic identity than those who engaged in fewer hours or none. However, athlete status, based on sporting achievement, was associated with athletic identity for men, not women; males with higher athlete status showing significantly higher athletic identity than males of lower athlete status. The mean scores on individual AIMS items were consistently lower than equivalent scores on the same items of the 10-item AIMS, for adolescent swimmers with disabilities and able-bodied adults (Thietje & Hirschfeld, 2017).

Two hundred sixteen individuals were interviewed, with a mean age at injury of 14 years and a mean age at follow-up of 29 years. Of all the complications, pressure ulcers, severe urinary tract infection (UTI), and spasticity had the greatest impact on

adult outcomes. Pressure ulcers were statistically related to all main outcomes. Severe UTI was statistically associated with all the outcomes except for marriage. Spasticity was associated with all the measured outcomes, except for marriage and life satisfaction. Life satisfaction was most significantly associated with severe UTI, pressure ulcers, pain, and respiratory complications (Vogel et al., 2014).

Patients with SCI may present with a copious of symptoms including pain, sensory and motor deficits, or autonomic and bowel/bladder dysfunction. Pain following SCI can be classified as either nociceptive or neuropathic pain. Patients have nociceptive pain due to musculoskeletal trauma or visceral perforation. Nociceptive pain which lasts beyond 12 weeks is chronic and likely arises from prolonged stimulation of nociceptive afferent fibers. Neuropathic pain is often more severe though of unclear etiology. Patients with nociceptive pain may report a shooting, burning sensation at, above, or below the level of their lesion. Sensory and motor deficits are common in patients with SCI. Injury to the descending white matter of the corticespinal tract causes loss of strength resulting in weakness and flaccid paralysis. If the spin-the anterior spinal cord are affected patients can lose temperature and pain sensation. Damage to the dorsal columns results in loss of vibration and discriminative tactile sensation as well as proprioception. However, while imaging may show a fracture at a particular vertebral level, the neurological deficit manifests only at the level where that the affected nerves sub serve below the affected vertebral level. For example, a T10 fracture may not produce a neurological deficit at T10 but instead will only become apparent at the lumbar levels. Autonomic function may be impacted in lesions above T6, resulting in a range of symptoms including hypotension, bradycardia, priapism, urinary retention or incontinence, and stool incontinence. Lesions above T6 can also lead to patients experiencing episodes of autonomic dysreflexia several months after their SCI. Autonomic dysreflexia is mediated by peripheral stimulation of sympathetic afferent fibers below the lesion level and is marked by severe headache, flushing, and hypertensive crises. In addition, autonomic dysfunction can lead to development of gastric ulcers and paralytic-ileus due to uninhibited vagal outflow. Autonomic symptoms secondary to SCIs between T1 and L2 may inhibit preganglionic sympathetic neurons, leading to loss of vascular tone and subsequent hypotension.

Lumbar level injury patients are at the highest risk of anal and urinary incontinence, resulting from impaired tonicity of the external anal and bladder sphincters, respectively. This issue of bowel and bladder dysfunction is socially debilitating and significantly affects patient quality of life. These symptoms often persist and may even worsen over time. One study found that the number of patients afflicted by an SCI who could voluntarily control their bowel and bladder decreased over a 20 year period (Hagan et al., 2022).

Short and long term functional targets are determined by the calculation of the patients' ASIA scale, taking into consideration medical and social status and the 13 individualized rehabilitation plans. Expected functions of motor complete injury patients at the end of the first year according to the level of the injury are given below (Nas et al., 2015).

High-Cervical Injury (C1 – C4), Most severe of the spinal cord injury levels, Leads to quadriplegia and trunk paralysis, may affect respiration too. Patient may have speaking problems, bladder and bowel incontinence and would always require assistance if no recovery occurs.

Low-Cervical Injury (C5 – C8), this spinal injury level involves C5 to C8 nerve roots. There would be no breathing or speech problems. The disability depends on spinal injury level.

C5 injury- has some or total paralysis of wrists, hands, trunk and legs, will require assistance with most activities of daily living, but can move from one place to another independently in wheelchair.

C6 injury – Paralysis in hands, trunk and legs, should be able to bend wrists back, can move in and out of wheelchair and bed with assistance/aid, No voluntary control of bowel/bladder, but may manage on their own with special equipment.

C7 injury- Most have normal movement of their shoulders, can do most activities of daily living , but need assistance with more difficult tasks, may be able to drive an adapted vehicle, no voluntary control of bowel or bladder but, may be able to manage on their own with special equipment.

C8 injury – Able to grasp and release objects, can do most activities of daily living by themselves, but may need assistance with more difficult tasks, may also be able to

drive an adapted vehicle, little or no voluntary control of bowel or bladder, but may be able to manage on their own with special equipment.

Upper Thoracic Injury (T1 – T5), this spinal cord injury levels affect muscles of upper chest, mid-back and abdomen. Arm and hand function is usually normal, paraplegia is present. Patients are able to use manual wheelchair. Some can stand in a standing frame, while others may walk with braces.

Lower Thoracic Injury (T6 – T12), This spinal cord injury level affects muscles of the trunk, usually results in paraplegia and there is normal upper-body movement, there is little or no voluntary control of bowel or bladder but can manage on their own with 14 special equipment, can use a manual wheelchair, learn to drive a modified car, stand in a standing frame, while others may walk with braces.

Lumbar Injury (L1 – L5), these generally result in some loss of function in the hips and legs. Little or no voluntary control of bowel or bladder, but can manage on their own with special equipment. Depending on strength in the legs, may need a wheelchair and may also walk with braces.

Sacral Injury (S1 – S5), Injuries generally result in some loss of functioning the hips and legs. Little or no voluntary control of bowel or bladder, but can manage on their own with special equipment. Most likely was able to walk (Singh, 2015).

Spinal cord injuries can be devastating leading to partial or complete paralysis. Spinal cord injuries were once frequently fatal, but over the past fifty years many new treatments have been developed to help people with spinal cord injuries survive and possibly recover a great deal of function. Within the past twenty years, even more promising treatments have been developed for spinal cord injury (Newsome & Melton, 2015).

3.1 Study design:

This study was a mixed-methods type of study. Participants' demographics, perceptions, and evaluations were given with descriptive statistics in the quantitative analysis. In the qualitative section, an open structured interview was recorded for a maximum of 25 minutes to get the best possible input from the participants. This mixed method helps to gain understanding and explore the feelings, attitudes, opinions, fears and behavior of spinal cord injury patients who were less than 16 years.

3.2 Study site:

The study was conducted at the Centre for the Rehabilitation of the Paralyzed (CRP) in Bangladesh which is the largest spinal cord injury rehabilitation centre for the patient with spinal cord injury in South Asia.

3.3 Study population:

The patients admitted at CRP spinal cord injury unit, Saver, Dhaka

3.4 Sampling procedure:

The samples were selected by convenience sampling method. It was be easy to get those subjects according to the criteria concerned with the study purpose through the convenience sampling procedure.

3.5 Data collection:

This study received both quantitative and qualitative data with respect to the subject of the study

3.6 Materials:

A mobile tape recorder was used during the interviews to record the conversation. Semi structured questionnaire and simultaneously pen and papers were also used to write down field notes.

3.7 Method of data collection:

Data were collected by conducting face to face interviews with providing open structured questionnaire form.

3.8 Duration of data collection:

Data was collected in between 15 March to 30 April to. Each data was collected carefully and confidentiality was maintained. Each participant provided particular time to collect data

3.9 Inclusion criteria:

1. All patients with spinal cord injury under 16 year ages.
2. Both male and female patient's within 16 year age group were selected.
3. Patient and their caregiver who were willing to participate in the study.

3.10 Exclusion criteria:

1. Spinal cord injury patient but age above 16.
2. The patient who is not willingly interested to participate the study.

3.11 Ethical consideration:

The research proposal was submitted to Institutional Review Board (IRB) of BHPI for oral presentation and defense was done in front of IRB. Then IRB approved the proposal. Researcher has followed the Bangladesh medical research council (BMRC) guideline & WHO research guideline. This protocol presentation was firstly submitted to the Institutional Review Board (IRB) of BHPI and initial permission was taken. Permission was taken from the Head of the Department of Physiotherapy, BHPI and head of the Department of Physiotherapy, CRP before data collection. Permission was taken from the In-Charge of SCI Unit, CRP for data collection from the patients. Researcher maintained the confidentiality of the collected data from the individuals. Researcher ensured the confidentiality of participants and shared the information only with research supervisor. All rights of the participants were reserved and researcher was accountable to the participant to answer any type of study related question.

Consent form:

Written consent (appendix) was given to all participants prior to completion of the questionnaire. The researcher explained to the participants about his or her role in this study and aim and objective of this study. The researcher received a written consent from every participants including signature. So the participant assured that they could understand about the consent form and their participation was on voluntary basic. The participants were informed clearly that their information would be kept confidential. The researcher assured the participants that the study would not be harmful to them. It was explained that there might not a direct benefit from the study for the participants but in the future cases like them might be get benefit from it. The participants had the rights to withdraw consent and discontinue participation at any time without prejudice to present or future care at the spinal cord injury (SCI) unit of CRP. Information from this study was anonymously coded to ensure confidentiality and was not personally identified in any publication containing the result of this study.

Table 1: Socio-demography related information:

Variable	Frequency(n)	Percentages (%)
Child Age		
0-8	1	20%
8-16	4	80%
Gender		
Male	2	40%
Female	3	60%
Education level		
Primary	2	40%
Secondary	3	60%
Living area		
Rural	4	80%
Sub rural	1	20%

Table 2: Injury related information

Criteria	Frequency	Percentages
Type of injury		
Traumatic	3	60%
Non traumatic	2	40%
Causes of Injury		
Fall from height	2	40%
Accidents	1	20%
Pathology	2	40%
Types of paralysis		
Paraplegic	4	80%
Tetraplegic	1	20%

Table 3: Patient diagnosis

Code	ASIA	Skeletal level	Neurological level	SCIM Score(total)on admission time
Case -1	B	C6	C4	28
Case-2	B	L1	L1	33
Case-3	B	T6	T7	33
Case-4	B	D11	D11	28
Case-5	A	D5	D5	32

Case presentation:

CASE 1: Tetraplegia, An 11 years old Girl.

History: A girl with 11 years old admitted to the spinal cord injury unit at CRP in the date of 23.01.2022. She was a student of class five. One day when she went to take bath unfortunately she fell down by slept her leg. Her family member took her to the nearest hospital where her main complaint was weakness in all four limbs because she assault in her neck but hopefully her bowel or bladder function was intake. According to doctor, she was required to be completely bedridden for up to two months following her spinal surgery. When she tried to walk after two months, she couldn't walk because she had lost sensation in both lower limbs, even though she had sensation in both lower limbs before her surgery. The client's caregiver also stated that she was unable to receive any physiotherapy treatment following surgery, which was not recommended. She was then admitted to CRP's spinal cord injury unit for better care. Clinical features: In those time her problems were abnormal muscle tone both upper and lower limb, decreased ROM of both upper limb and lower limb, decreased muscle power both upper limb and lower limb, functional activities and transitional movement were poor, weak cough and respiratory muscle. Investigation, MRI: Compression fracture with significant reduction of body involving C6 vertebra and mild Para vertebral soft tissue injury at C6 and C7 vertebra. Her diagnosis was post operative case of tetraplegic with bowel bladder function impairment and frozen shoulder was diagnosed at right side. Her ASIA level was B on admission time. Treatment Goals: Try to reduce chest pain and increase lung volume , try to normalize muscle tone both upper limb and lower limb, improve range of motion of both upper limb and lower limb, improve muscle power of both upper limb and lower limb, improve sensory status, improve functional activities and transitional movement, prevent secondary complication. According to goals treatment plan were chest mobilization to reduce chest pain, spiro meter exercise to increase lunge volume, positioning, weight bearing, stretching exercise for abnormal muscle tone, Treatment plan: Active and passive ROM exercise for maintaining normal joint range motion, sensory stimulation according to Rood approach for sensory status improvement, balance and coordination exercise for improvement of balance and coordination. Outcome: After received physiotherapy about 2 month 14 days her chest pain reduced with increase lung volume and improves respiratory muscle strength. And patient was

able to partially daily living activities. Her muscle strength improves upper limb grades 3 to 4 and lower limb 1 to 2. Sensation improves in both lower limbs according to patient statement.

Table 4: Range of motion on admission time (case: 1)

Upper limb	AROM	PROM
shoulder	Full ROM	Full ROM
Elbow	Loss 50	Full ROM
Wrist	Loss 20	Full ROM
Fingers	Loss 10	Full ROM
Lower limb	AROM	PROM
Hip	Total loss	Full
knee	Loss 90	Full
Ankle	Total ROM loss	Full

Table 5: Motor power on admission time (case: 1)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	5	5	4	4
Left	5	5	5	4	4
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	2	2	0	0	0
Left	2	2	0	0	0

Table 6: Motor power after received physiotherapy (case: 1)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	5	5	5	5
Left	5	5	5	5	5
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	3	3	2	2	1
Left	3	3	2	2	1

CASE 2: paraplegia, a 13 year old boy.

History: A 13-year-old youngster was admitted to CRP's spinal cord injury unit. He and her family would live in a remote location near Lalmonirhat. He was a sixth-grade student. He went to play with her buddies one day. He climbed up a tree with companions, suddenly he fall from tree four years ago. He was transferred to their district hospital after his mishap. The doctors treated the patient there. When he was stable enough for surgery, the operation was performed there with spinal fixation. She then turns her attention to CRP for rehabilitation. He returns to his village in 2018 after finishing his rehabilitation. He was being readmitted to the spinal cord injury unit at CRP for a pressure sore complication with grades (iii) in the right trochantere area. Investigation, MRI: Anterior listhesis T11 over T12 on his MRI. Problems list: His associated problem were pain and swelling, muscle wasting, flaccid tone both lower limb, decreased muscle strength and joint range of motion, poor pelvic control, decreased bed mobility. Goals of treatment: Normalize muscle tone, enhance proprioceptive range of motion, improve pelvic control, and improve bed mobility, to be independent with wheel chair was a long-term objective. Treatment plan: Therapeutic drugs for pressure sores and physiotherapy was included for other complication as well as positioning, weight bearing, and stretching exercises for abnormal muscle tone, isometric and isotonic exercise to improve muscle strength, and active and passive range of motion exercises to maintain normal joint function. Sensory stimulation based on the Rood technique to increase sensory status, balance

and coordination exercise and home advice to prevent secondary complication. Outcome: After the session of 2 month 4 days physiotherapy programmed Patient was able to do his activities of daily living such as self care (eating, dressing, toileting, bathing) by himself. He was able to standing from sitting the client's caregiver mentioned that since his child has been suffering from his injuries for four years, their financial issue is worsening. Although the client's confidence is positive to his life, he is considered as a burden by his family and society. As a result, he becomes depressed in any situation and at any moment. But he wants to be financially stable by doing job that is suitable for him.

Table7: Range of motion on admission time (case: 2)

Upper limb	AROM	PROM
Shoulder	Full ROM	Full ROM
Elbow	Loss 20	Full ROM
Wrist	Loss 10	Full ROM
Fingers	Loss 10	Full ROM
Lower limb	AROM	PROM
Hip	Total ROM loss	Full ROM
knee	Loss 90	Full
Ankle	Total ROM loss	Full

Table 8: Motor power on admission time (case: 2)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	5	4	4	4
Left	5	5	4	4	4
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	3	2	1	1	1
Left	2	2	1	1	1

Table9: Motor power after received Physiotherapy (case: 2)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	5	5	5	5
Left	5	5	5	5	5
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	4	3	2	2	2
Left	3	3	2	3	2

CASE 3: Paraplegic, an eight years old girl.

History: She was a young girl of eight years old. Her family and she would live in a rural place. She went to her father in the field where he was working one day. There, on 1 March 2022, she was scurf hurt by a tractor. She received conservative care from a nearby hospital after her injuries. Her major complaint was weakness in both lower limbs and bowel bladder function impairment when she was admitted to the spinal cord injury unitsat CRP 15 April 2022.For a better diagnosis and therapy, she underwent physical and neurological examinations. Problem list: Pain in lower limbs, decreased muscular tone and power in lower limbs, poor balance and coordination, poor functional activities, and poor transitional movement. Investigations MRI: Complete dislocation of L1 over L2 injury to right psoas muscle. Diagnosis: Paraplegic patient with bowel bladder function impairment with ASIA (B). Treatment goals included reducing discomfort, normalizing lower limb muscle tone, reducing pain and swelling, and improving range of motion, improving pelvic control, and increasing bed mobility. Long term goal was to be independent with or without assistive device. Treatment plan, quick passive stretching to increase muscle tone, active and active assistive exercise for maintaining joint range of motion, isometric and isotonic exercise for increasing muscle strength, balance and coordination exercise for development of balance and coordination, practice sitting ,standing, and walking gradually, practice daily living activities. Outcome: As this patient surgery will be required pre operative physiotherapy management was continuing. According to patient statement her pain was reduced than before. Improves bed mobility and pelvic mobility than before. Mental status: Though they are economically insufficient but the client was mentally strong her confidence level was high she thinks she will be recovery soon and she will continue her study. She can perform her daily living activities partially.

Table 10: Range of motion on admission time (case: 3)

Upper limb	AROM	PROM
shoulder	Full ROM	Full ROM
Elbow	Full ROM	Full ROM
Wrist	Full ROM	Full ROM
Fingers	Full ROM	Full ROM
Lower limb	AROM	PROM
Hip	Loss 90	Full ROM
Knee	Loss 80	Full ROM
Ankle	Loss 50	Full ROM

Table 11: Motor power on admission time (case: 3)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	5	5	5	5
Left	5	5	5	5	5
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	3	2	1	1	1
Left	2	2	1	1	1

Table 12: Motor power after receiving physiotherapy (case: 3)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	5	5	5	5
Left	5	5	5	5	5
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	4	3	3	3	3
Left	4	3	3	3	3

CASE 4: Paraplegia, A 14 year old boy.

He was 14 years old and he was a student of class six. He was very talent and regular student in his class. Causes of his injury were fall from height due to electric shock: After injury he was admitted Dhaka medical college and hospital. Investigation MRI: Complete listhesis of D6 and D7. There he gets received treatment at first for complication of burn then operation was successfully done for listhesis. Then he returned home after completing his treatment he could moves through manual wheelchair. After staying three month in his village different secondary complication he faced including pressure. Now he is admitted spinal cord injury unit at CRP for better management of secondary complication with pressure sore. Problem list: His other problems is pain at chest, flaccid muscle tone, decreased active and passive range of motion of lower limb, impaired sensation and proprioception below the injury level, develop pressure sore and joint stiffness. Goals of treatment were try to reduce chest pain, try to remove pressure sore complication, try to reduce pain and swelling, try to improve range of motion, try to improve pelvic control, try to improve bed mobility, long term goal to be independent with assistive device. Treatment plan is postural correction; try to minimize chest pain by breathing exercise, positioning, and chest mobilization. Positioning, weight bearing, stretching exercise for abnormal muscle tone. Active and passive ROM exercise for maintaining normal joint range of motion. Sensory stimulation according to Rood approach for sensory status improvement. Balance and coordination exercise for development of balance and coordination. They also strongly decided to provide home advice to prevent secondary complication. Outcome: Pressure sore management was continuing, but his pressure sore grades then 5 to 2. Though physiotherapy was not provided according to goal due to her pressure sore complication after receiving physiotherapy about 2 months increase his joint range of motion and improves muscle power than before.

Table 13: Range of motion on admission time (case: 4)

Upper limb	AROM	PROM
Shoulder	Full ROM	Full ROM
Elbow	Full ROM	Full ROM
Wrist	Full ROM	Full ROM
Fingers	Full ROM	Full ROM
Lower limb	AROM	PROM
Hip	Loss 90	Full ROM
Knee	Loss 80	Full ROM
Ankle	Loss 50	Full ROM

Table 14: Motor power on admission time (case: 4)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	4	4	4	3
Left	5	5	4	4	3
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	3	2	0	0	0
Left	2	1	0	0	0

Table 15: Motor power after receiving physiotherapy (case: 4)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	5	5	5	5
Left	5	5	5	5	5
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	4	3	2	2	1
Left	4	3	2	2	1

CASE: 5 Paraplegia, A 12 years old girl.

History: She was a twelve-year-old girl. She was a fifth-grade student. She had an allergic reaction since she was five years old, and she had to consult a doctor on often. She went to the local hospital with her mother because she had an allergic reaction to her skin. When the doctor investigated her skin, he determined that she had scoliosis and recommended her to an orthopedic specialist. Her operation was performed in their district hospital. The doctor diagnosed her problem after a physical examination and investigation: MRI: scoliosis with neurofibromatosis. Both lower limbs weakness as well as bowel bladder function impairment was noticed after her operation. Few days later she was admitted at CRP spinal cord injury unit for her rehabilitation. Multidisciplinary team of this unit completed her comprehensive assessment and take necessary plan and care. Diagnosis: Scoliosis and neurofibromatosis in a post-operative individual with ASIA (B.), Problem : On admission time her problem were pain at operation area, spastic tone at both lower limb, impaired sensation both lower limb below the level of injury, poor pelvic and trunk control, poor balance and coordination, poor functional activity. Goals of treatment: try to reduce pain, try to normalize muscle tone, and try to improve range of motion, try to improve pelvic control, and try to improve bed mobility, to achieve the functional level of independence, to make patient ambulatory with or without assistance. Treatment plan were positioning to correct posture, positioning, weight bearing, stretching exercise for abnormal muscle tone, isometric and isotonic exercise to improve muscle strength, active and passive ROM exercise for maintaining normal joint range of motion.

Sensory stimulation according to Rood approach for sensory status improvement, balance and coordination exercise for development of balance and coordination, practice daily living activities. Outcome: Though her physiotherapy treatment course was not completed. Her positioning and pain management was continuing. She reported that her pain reduced than before. According to tone measurement scale her spasticity was reduced. Improves bed mobility and improves muscle power.

Table 16: Range of motion on admission time (case: 5)

Upper limb	AROM	PROM
shoulder	Full ROM	Full ROM
Elbow	Loss 50	Full ROM
Wrist	Loss 20	Full ROM
Fingers	Loss 10	Full ROM
Lower limb	AROM	PROM
Hip	Total loss	Full
knee	Loss 90	Full
Ankle	Total ROM loss	Full

Table 17: Motor powers on admission time (case: 5)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	4	4	3	3
Left	4	4	3	2	2
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	2	1	0	0	0
Left	2	2	0	0	0

Table 18: Motor power after receiving physiotherapy (case: 5)

Upper limb	(C5)	(C6)	(C7)	(C8)	(T1)
Right	5	5	4	4	4
Left	5	4	4	3	3
Lower limb	(L2)	(L3)	(L4)	(L5)	(S1)
Right	3	2	1	1	0
Left	3	2	2	1	0

The study was conducted with 5 participants all of them were student. Among the total participant 80 % (n=4) was living rural area and 20% (n=1) were living sub rural area .Most of them were 10 to 15 years and most of participant were paraplegic. In this study it was found that most of the patients 80% (n=4) were incomplete B and 20% were complete A, according to impairment grading in ASIA scale. According to that study it were also found that among the 5 participants of SCI pediatrics patient most of the participants were injury in thoracic level 60% (n = 3), lumber level were 20% (n=1) and rest 20% (n=1) were cervical level. According to that study it were also originated that 60% (n=3) were traumatic cause and 40% (n=2) were non traumatic causes among the total 5 participants. The study also demonstrated that within traumatic causes fall from height was the major cause. The rest causes was motor vice accident. The previous literature showed that there appeared to be two unique processes that influenced younger children. Younger children were more likely to be harmed in motor vehicle accidents (MVAs), whereas teenagers were more likely to be hurt while participating in sports. According to another survey, motor vehicle accidents accounted for 52% of injuries, followed by sports injuries (27%), of which 29% were related to football. It was also originated that 68% of patients had the cervical level of injury, 21% patients was thoracic level injured and rest of them were lumber level injured. The fatality rate in this series was 18.5 percent, and it mostly happened to younger children (mean age 5 years). It was almost always caused by a motor vehicle accident (95 percent), and it was most often linked to an upper cervical spine injury (74 percent). Another study evaluated that scoliosis developed more frequently (23%) in pre-teens (< 12 years of age) than in adults (5%). (Parent et al., 2011).

Another study also showed that a total of 212 patients were included in their review with age of participants ranging from 2.5 to 18 years (mean, 15.4 years). Most patients were male (n = 162; 76.4%). The commonest cited cause of injury were falls from height (n = 104/212; 49.1%). The most common level of injury was cervical (n = 83; 39.2%). Most patients underwent surgery (Dally et al., 2022).

Our study found that the most common mechanism of injury was fall within traumatic injury and most patients experienced injuries at the lumbar region and their mean age was 11.5 years. This study also showed that scoliosis was present only within one participant among the total 5 participants. All of them needed to undergo surgery.

The literature showed that physiotherapy interventions played a vital role in case of improving their physical and mental status, included stretching exercise, active and passive range of motion exercise, strength training, mobility training, wheelchair mobility training, fitness training, cycling with ES, general exercise and transcutaneous electrical nerve stimulation. After receiving these physiotherapy treatments significant improvements were seen among the participants. Such as motor function, sensory status, transitional movement, gross motor function, regain gait ,and functional activities were improved most of the clients(Hervey et al., 2018).

Another study showed that After 13 physical therapy treatments over 5-weeks, the spinal cord injury patient was able to ambulate independently and perform all activities of daily living without pain or functional limitation. The following case report outlines this patient's successful journey toward recovery (Butts et al., 2021).

The study also demonstrated that physiotherapy plays important role for reducing post operative complication. The study originated that physiotherapy help to increase joint range of motion, increase muscle strength, normalize muscle tone, reducing pain, decrease the pressure sore complication in addition to improves the mental health status according to patient statement. Physiotherapy plays maximum role for rehabilitation of spinal cord injury patient, the study showed that majority of children were suffered pressure sore complication due to lack of proper physiotherapy, if we aware about our physiotherapy service we can reduce the permanent impairment of spinal cord injury patient as well as they can regain their maximum functional abilities. The study also established that in rural areas living children are more respected in this accident and fall from height is the main cause in case of developing country though the sports and motor vice accident is the main causes of developed country. Other result of this study the children whose are financially poor their parents are more depressed about their life. Among the 5 cases 3 participants were more depressed about their life and their financial background was very poor.1 participant were comparatively less depressive as well less depressive participants had more

confidence about their life they want to continue their study like as before their dream they will do job for their own and their family. The study showed that school going children are more respected in traumatic spinal cord injury due to their childhood characteristics mainly climbing tree (fall from height). The study also showed that secondary complication in post operative ceases mainly happened most of the clients due to lack proper home advice and post operative physiotherapy management. Literature established that though Spinal cord injury (SCI) is one of the most devastating conditions known to mankind. But pediatrics spinal cord injury is more pathetic for everyone. Because it is not familiar word for a nation or people.

Spinal cord injury (SCI) is an insult to the spinal cord resulting in a change, either temporary or permanent, in its normal motor, sensory, or autonomic function. Although spinal cord injury is one of the most serious injuries that a person can survive, it is possible to return to a healthy, happy and productive life after even the most severe of cord injuries. Achieving this outcome, however, is a monumental task that requires the coordinated efforts of the spinal cord injured person, his or her family and a specialized multidisciplinary team of professionals. After all we can reduce spinal cord injury by raising awareness among the people as well as its complication can be reduced by spreading the physiotherapy services. From the moment of injury onward, specialized care is essential for maximization of health as well as psychosocial and functional adaptation and prevention of developing secondary complications. After SCI, patients lose some extent of functional abilities. But it is very important to try to return their functional ability. First of all awareness among people should be raised to prevent pediatric as well as any age group community spinal cord injury. It should be ensured that the clients can receive treatment from a multidisciplinary team of professionals.

Recommendation: The aim of the study was find out the demography, causative factor and medical histories of pediatric spinal cord injury patients who are less than 16 years at the CRP spinal cord injury unit. However, the study had some limitations it some steps were identified that might be taken for the better accomplishment of further study. The main recommendations would be as follow: The random sampling technique rather than the convenient would be chosen in further in order to enabling the power of generalization the results. The duration of the study was short; data collection duration was so short so the researcher would not be able to find out the total rehabilitation outcome each individual so in future wider time would be taken for conducting the study. Investigator uses only 5 cases as the sample of this study, in future the sample size would be more. In this study, the investigator took the sample from CRP SCI unit; it was small area to take available sample. So for further study investigator strongly recommended to include the person with SCI from the community or all over the Bangladesh to ensure the generalizability of this study.

Consent form for Interview of the participant

Assalamualaikum/Namasker, my name is Nadia. I am conducting this study for a B.Sc in Physiotherapy project study dissertation titled ‘A case Series of Pediatric Spinal Cord Injury (SCI) Patients Attending at CRP’ under Bangladesh Health Professions Institute (BHPI), University of Dhaka. I would like to know about some personal and other related information regarding Spinal cord injury. I will ask you some question and I hope you will answer with honesty and confidently. This will take approximately 30 minutes. I would like to inform you that this is a purely academic study and will not be used for any other purpose. The researcher is not directly related with this Spinal cord injury area, so your participation in the research will have no impact on your present or future treatment in this area (Spinal cord injury unit). All information provided by you will be treated as confidential and in the event of any report or publication it will be ensured that the source of information remains anonymous and also all information will be destroyed after completion of the study. Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences. You also have the right not to answer a particular question that you don’t like or do not want to answer during interview. If you have any query about the study or your right as a participant, you may contact with me, researcher and/or Mohammad Anwar Hossain, Associate Professor, department of physiotherapy, CRP, Saver, Dhaka.

Do you have any questions before I start?

So, may I have your consent to proceed with the interview or work?

Yes

No

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Questionnaire:

Personal details:

ID no:

Name of participant:

Address: Village/house no.....

Post office.....

Thana..... District.....

Contact number: Date of interviewed/MM/YY.....

Socio demographic information:

Age:

Sex:

1= Male

2= Female

Educational level:

1=No formal Schooling

2=Less than primary School

3=JSC Completed

4=SSC Completed

Occupation:

1=student

2=others

Residential area:

1= Sub rural

2 = Rural

Family type:

- 1= Nuclear family
- 2= Extended family

Monthly family income:

- 1 = No income
- 2 = 1000 – 5000
- 3 = 6000 – 10,000
- 4 = 11,000 – 15,000
- 5 = > 15,000 46

Injury related information:

Date of injury: DD/MM/YY-----

Date of admission: DD/MM/YY-----

Skeletal level of injury:

- 1 = Cervical
- 2 = Thoracic
- 3 = Lumber
- 4 = No

Type of injury:

- 1 = Complete paraplegia
- 2 = Incomplete paraplegia
- 3 = Complete tetraplegia
- 4 = Incomplete tetraplegia

Cause of injury:

1=Traumatic

- a = Road traffic accident
- b = Fall from height
- c = Fall of over loading
- d = Shallow diving
- e = Motor vehicle
- f = Motor cycle
- g = Bicycle
- h = Gunshot injury
- i = Others

2= Non traumatic:

Neurological level:

- 1 = ASIA scale: A
- 2 = ASIA scale: B
- 3 = ASIA scale: C
- 4 = ASIA scale: D
- 5 = ASIA scale: E

How did the accident happen?

Where do get treatment after injury?

What your present complication?

Do you have spinal deformity?

How did you get information about CRP?

What your opinion about physiotherapy? Is it needed? Why?

How much functional improvement achieve after receive physiotherapy?

In your opinion, what are the challenges in the treatment of spinal cord injury?

Do you think that you will reach your goal?

What's your future plan? (Going to school or not)

Do you think you are burden in your family?

What's your perception in community participation?

Permission letter

March 23,2022

The Head of the Physiotherapy Department
Centre for the Rehabilitation of the Paralysed (CRP)
Chapain, Savar, Dhaka-1343.

Through: Head, Department of Physiotherapy, BHPI

Subject: Seeking permission for data collection of 4th year Physiotherapy Research Project.

Sir,

With due respect and humble submission to state that I am Nadia student of 4th year B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). In 4th year course curriculum, I have to conduct a research project. The ethical committee has approved my research project entitled on "A case series of paediatrics spinal cord injury patients attended at CRP" under the supervision of Ehsanur Rahman, Associate Professor, Physiotherapy Department, Bangladesh Health Professions Institute (BHPI). I would like to collect data, for which I need your kind approval. I assure that anything of my study will not be harmful for my participants.

I therefore, pray and hope that you would be kind enough to grant my application and give me permission for data collection and oblige thereby.

Yours faithfully

Nadia

Nadia

4th year, B.Sc. in Physiotherapy

Roll. 14, Session: 2016-2017, ID No: 112160336

Bangladesh Health Professions Institute (BHPI)

CRP, Chapain, Savar, Dhaka-1343.

Forwarded
E. Rahman
29/3/2022

Recommended
Shofiq
29.03.2022

Md. Shofiquil Islam
Associate Professor & Head
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343

Allow for data collection from SCI Unit. Approved
Muzaffor Hossain 30/3/22
MUZAFFOR HOSSAIN
Lower Consultant-Physiotherapy & Incharge
Spinal cord injury (SCI) Unit, Physiotherapy Department
CRP Chapain, Savar, Dhaka-1343

MOHAMMAD ANWAR HOSSAIN
Senior Consultant &
Head of Physiotherapy Dept
Associate Professor, BHPI
CRP, Savar, Dhaka-1343



বাংলাদেশ হেল্থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref:

CRP/BHPI/IRB/02/2022/560

Date:

22/02/2022

Nadia
4th year B.Sc in Physiotherapy
Session: 2016-2017
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the research project proposal “A Case series of paediatric spinal cord injury patients attending at CRP” by ethics committee.

Dear Nadia,

Congratulations.

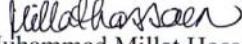
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, as the principal investigator and Ehsanur Rahman as thesis supervisor. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Dissertation Proposal
2	Questionnaire (English & Bengali version)
3	Information sheet & consent form.

The purpose of the study is to gain in-depth insight and understandings from the paediatric spinal cord injury patients in order to understand their case history. Should there any interpretation, typos, spelling and grammatical mistakes in the title, it is the responsibilities of the investigator. Since the study involves questionnaire that takes maximum 20- 30 minutes and have no likelihood of any harm to the participants, the members of the Ethics committee approved the study to be conducted in the presented form at the meeting held at 09:00 AM on October 12, 2021 at BHPI (30th IRB Meeting).

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,


Muhammad Millat Hossain
Assistant Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh