

**SUSCEPTIBILITY OF PRESSURE ULCER DEVELOPMENT OF
PATIENTS WITH SCI IN ACCORDANCE WITH LIFESTYLE AT
COMMUNITY IN BANGLADESH**

By

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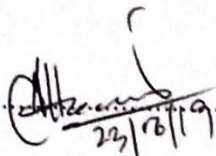
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SUPERVISOR'S STATEMENT

As the supervisor of the Mr. Dronacharya Gyawali's Thesis work, I certify that I consider his thesis "SUSCEPTIBILITY OF PRESSURE ULCER DEVELOPMENT OF PATIENTS WITH SCI IN ACCORDANCE WITH LIFESTYLE AT COMMUNITY IN BANGLADESH" may be suitable for examination.

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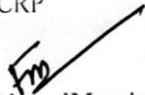
We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for acceptance of this thesis entitled, "Susceptibility of pressure ulcer development of patients with SCI in accordance with lifestyle at community in Bangladesh".

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This work has not been previously accepted in substance for any degree and is not concurrently submitted in candidature for any degree. This dissertation in being submitted in partial fulfilment of the requirement for the degree of MSc in Rehabilitation Science. This dissertation is the result of my own independent work /investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references. A bibliography is appended. I conform that if any things identified in my work that I have done plagiarism or any form of cheating that will directly awarded me fail and I am subject to disciplinary action of authority.

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List of abbreviations and acronyms

- **CRP:** Center for Rehabilitation of Paralyzed
- **CI:** Confidence interval
- **EPUAP:** European Pressure Ulcer Advisory Panel
- **NPUAP:** National Pressure Ulcer Advisory Panel
- **OR:** Odds ratio
- **PU:** Pressure Ulcer
- **QOL:** Quality of Life
- **SCI:** Spinal Cord Injury
- **TSCI:** Traumatic Spinal Cord injury
- **UTI:** Urinary Tract Infections
- **WHO:** World health organization
- χ^2 : chi-square

ABSTRACT

Background: With spinal cord injury there are chances of having secondary complication and pressure ulcer is one of them, which is causing morbidity and increase in mortality among the patients especially in the community patients living with spinal cord injury. **Objectives:** To study the associations between selected daily living lifestyles factors and pressure ulcer development in adults with spinal cord injury (SCI). **Methods:** 1:1 case-control study was carried out among to accomplish the objective of this study. A total 80 participants, 40 cases with pressure ulcer and 40 controls with no pressure ulcer were taken as sample. The well-structure questionnaire was used to identify the possible lifestyle factors with risk in pressure ulcer development. Data was analyzed by using SPSS and various tests such as frequency distribution, chi-square (χ^2) and odds ratio. Odd ratio was calculated as a model of association between exposure and outcomes. **Results:** Factors that significantly increased the risk of having pressure ulcer were being male (OR=3.12; 95% of CI=1.18- 8.2) and incontinence of bladder (OR=2.5, 95% of CI=1.016-61.49). Factors that significantly protected against pressure ulcer were avoiding smoking (OR=0.74, 95% of CI= 0.065-0.464), doing exercises to keep joint flexible (OR= 0.086; 95% of CI= 0.028-0.267), doing strengthening exercise (OR=0.07, CI=0.22-0.25), doing leg activities which help to increase bone density (OR=0.37, 95% of CI=0.26-0.51), visiting therapist to monitor exercise (OR=0.098, 95 % of CI= 0.02-0.447), pay attention to position body in wheelchair (OR= 0.365, 95% of CI= 0.264-0.506), pay attention to position body while sleeping (OR=0.01, 95% of CI= 0.02-0.45), know what do when contracture begin (OR= 0.15, 95% of CI= 0.06-0.41), checking skin regularly (OR= 0.365, 95% of CI= 0.26-0.51), perform pressure relief every 30 min (OR= 0.073, 95% of CI= 0.019-0.277), careful while transfer (OR= 0.038, 95% of CI= 0.05-0.309), wear something on foot when out of bed (OR= 0.043, 95% of CI= 0.009-0.203), aware of wheelchair cushion (OR= 0.06, 95% of CI= 0.007-0.487), accessible house (OR= 0.091, 95% of CI= 0.027-0.304), using intermittent catheter (OR= 0.328, 95% of CI= 0.111-0.969), using catheter as directed (OR= 0.265, 95% of CI= 0.085-0.83) and using rectal suppository for bowel management (OR=0.11, 95% of CI 0.029–0.416). **Conclusion:** This study showed highest risk among being male and patient with incontinence of bladder as significant risk in pressure ulcer development.

1.1. Introduction

Spinal Cord injury (SCI) is traumatic or non-traumatic medical condition, which is unexpected, distressing, intrincating (Sezer et al., 2015); and associated with decreased life expectancy (Middleton et al., 2012; Hagen, Lie, Rekand, Gilhus & Gronning, 2010). Traumatic spinal cord injury (TSCI) is the most damaging injury leading to varying degrees of complete/incomplete motor and sensory loss in the region of cervical, thoracic, lumbar- Sacral and other areas in the body, with or without bladder/bowel and sexual dysfunction (Kirshblum et al., 2011) in both developing and developed countries (Masseti & Stein, 2018).

Injury to spinal cord changes the life situation of a person completely, leaving behind the functional, psychological and socio-economic disorder and series of complications to follow (Sezer et al., 2015).

SCI incidence and prevalence in different countries worldwide ranges at the rate of 3.6 to 195.4 cases per million across the globe (Jazayeri, Beygi, Shokraneh, Hagen, & Rahimi-Movaghar, 2015). In United States the annual incidence of the SCI is 40 cases per million, where male's dominance is higher i.e. four times than females. The causes for SCI include motor vehicle accidents (32.4%-38.5%), falls (17-21%), Gunshot wound (15.3%) and diving (5.9%) leading to the neurological deficits. Incomplete tetraplegia is higher in the neurological category with only one percent persons experiencing the full/complete recovery during discharge (National Spinal Cord Injury Statistical Center, 2017).

The incidence rate of traumatic SCI in Asia and middle east was reported between 14.6 and 246.0 people per million/year (Furlan et al., 2013); however, ages ranged from 20.6 to 35.4, affecting low- and middle-income countries with male dominance (Vasiliadis, 2012). The global prevalence of SCI ranges between 223–755 per million (Wyndaele & Wyndaele, 2006). United States of America has the highest SCI prevalence of 906 per million and lowest in France i.e. 250 per million. The majority of studies have shown a high male-to-female ratio and a peak age being less than 30

years old. The most common cause was road accidents; and falls in elderly population (Singh et al., 2014).

There are acute and chronic complications following spinal cord injury. The acute complications include neurogenic shock, cardiovascular diseases, abnormal temperature regulation, abnormal sweat secretion, respiratory complications and dysphagia, thromboembolism and pressure ulcers, heterotrophic ossification, bladder and bowel dysfunction, spasticity, pain, musculoskeletal and metabolic complications, sexual complications, anxiety and depression and associated injuries (Hagen, 2015). Chronic medical condition following spinal cord injury prevails the chronic complications, and may interfere with the care of the patients. Common complications follow different patterns in different systems of the body. The common respiratory complications are atelectasis, pneumonia and respiratory failure. Cardiovascular complications are orthostatic hypotension and autonomic dysreflexia. One of the most common complications arise in genitourinary and gastrointestinal function leading to bladder dysfunction and neurogenic bowel. Common secondary complication is spasticity. Pain syndromes comprises of nociceptive pain, neurogenic pain. Potentially the life-threatening complications is Pressure ulcer. SCI population are experiencing osteoporosis and bone fractures (Kemal, 2015).

In poor developing country like Bangladesh, over age of 14 years sixty one percent are literate where spinal cord injury and its health- related complications are a major problem as they cause a lot of morbidity, death and economic problems with a patient developing life threatening complications (Chhabra &Arora, 2012; Islam, Hafez, & Akter, 2011). Moreover, these patients can be actually helped to re- integrate in the community through proper treatment and specialized rehabilitation. The only one non-government organization working in the rehabilitation and reintegration of the patients following SCI is the Centre for the Rehabilitation of the Paralyzed (CRP), which is serving for the patients from past 30 year; while there are no any specialized hospitals targeting the rehabilitation is being initiated by the government (Quadir et al., 2017). CRP uses the multidisciplinary and interdisciplinary approach for continuum patient care and extending its services which emphasis on the development of CBR programs. (Hoque et al., 1999).

Pressure ulcer is the serious burden to the family, patient and medical team. The community residing spinal cord injury patients have different way of living life and it can influence the state of wellbeing and development of the pressure sore. Pressure sore

is the most prevalent secondary health complications in the developing countries (Zakrasek et al.,2015). Spinal injury occurring in adults are in high risk of developing pressure sore due to decreased mobility and diminished sensitivity of skin. Longer sitting time is associated with recurrent pressure ulcer among veterans after discharge (Guihan et al.,2008). There are many instances where the major secondary complication in spinal cord injury is followed by pressure ulcer. Almost-all the patients with complete spinal injury develop pressure ulcers, though it is not directly associated with spinal cord injury (Burns et al., 2012).

The care giver and patient face unique challenges of accessing the medical services, on top of that if they manage to reach the hospital, proper rehabilitation service and trained rehabilitation specialists are missing (Haig et al., 2009).

There is association of lifestyle choices with the prevention or the occurrence/development of the pressure ulcer. These choices are affected by various lifestyle risk factors of daily living like wheelchair and cushion factors, protective factors, defecation and urinary factors, and social participation (Morita et al.,2015). A study showed that in hospital about 10% patients and 5% of patients residing in community are found to be having pressure sore (Gorecki et al., 2009). Most of wheelchair bound spinal cord injured patients are dying of pressure sore within the first two years following community discharged in Bangladesh (Hossain et al.,2016).

Institutional based rehabilitation services are showing to have promising functional outcomes in the SCI patients, but the challenges lie on the reintegration of patient back to community (Li et al., 2012). The consequences of pressure ulcer comprise huge medical, economic burden on the patient (Sankaran et al., 2015; Byrne et al., 1996). So, prevention of pressure sore is the best way to ensure that people will continue their daily activities and stay in communities. Individuals living with SCI need to adapt with various challenges, of which adjusting their community life is great challenge.

The main challenge for people living with spinal cord injury starts when they return home after institutionalized rehabilitation and they have to reintegrate, participate in society and continue their daily lifestyles. Their lifestyle determines the daily activity they carry on and it can have positive and negative effects in the health outcome of the spinal cord injured patients. It is important to carry out the routinely advise gained during rehabilitation like lifting, skin inspection, personal hygiene and balance the

nutritional status and participate in daily life to counter the chance for development of the pressure sore and improve the overall quality of life.

This study will mainly focus on the patient who developed pressure sore in the community. To determine which daily living factors influenced influence and are susceptible for pressure ulcer development among community residing patients with spinal cord injury. Also, it will determine which factors are protective factors for preventing pressure sore development.

1.2. Justification of the study

Following SCI, the patients have diminished sensation below the level of injury, making them vulnerable to pressure development in tissues below the site. This ultimately compresses the blood flow to the tissues, making the area vulnerable to sore development. Patients are even vulnerable if the hygiene is not maintained after injury. The incontinence of urine and fecal management is a prime concern which predisposes the person to sore worsening and infection. Basic activity for care of the skin and individual daily lifestyle is utmost important in preventing pressure sores.

A study in Bangladesh showed that patients who depend on wheelchair and discharged from hospital, about one in five are found dead within 2 years of discharge. These deaths were caused by sepsis in pressure ulcer and could be prevented (Hossain et al., 2016).

Epidemiology study on spinal cord injury in Bangladesh has shown that about 52% cases had the diagnosis of traumatic paraplegia and 42.6% had the diagnosis of traumatic tetraplegia, most of the cases were fall from the heights and road traffic accidents (Rahman et al., 2017). These patients when discharged from the centers are at higher risk of resulting in pressure sore development after discharge.

Most of the people activities of daily living influence the lifestyles they follow every day. The severity of the SCI related pressure ulcer related issue directs that suitable protective measures must be taken for its prevention. Medical recommendations for prevention include obtaining sufficient rest on bed; performing pressure reliefs at regular intervals and also checking their skin regularly; maintaining and adhering to the program for managing bowel and bladder avoiding any moisture so that the skin remains dry; moreover also utilizing and keeping up proper pressure redistribution devices/ equipment's like using mattress that decreases friction or proper cushioning/ padding to line inward surface of braces covering hard prominences and community participation following discharge at home (Catz et al., 2005; Consortium for Spinal Cord Medicine, 2000; National Pressure Ulcer Advisory Panel [NPUAP], 2006; Wilborn et al., 2006).

A study from Clark and his colleagues in 2016 suggested that people involving for pressure ulcer preventive is strongly influenced and associated with a complex set of daily lifestyle influences. In this regard, the instructions that patients with SCI get amid

their early stages of recovery and rehabilitation care is often decontextualized in long run and may not transfer to their definite life settings.

According to the available literature no one has done this study in Bangladesh and it is a feasible study.

So, by this study the researcher will be able to identify the influencing factors in developing the pressure ulcer among the community residing individuals with spinal cord injury. Moreover, it will add on the existing insight in the pressure sore development in the community, which will be helpful in improving the medical, social, psychological and overall quality of life status of community residing spinal cord injured patients.

1.3. Research Question:

What is the association of daily living lifestyles factors and susceptibility of pressure ulcer development in community living patients with SCI in Bangladesh?

1.4. Operational definition

Spinal Cord Injury

Spinal cord injury is damage to the spinal cord that follows in a loss of function such as ability to move, disrupting their overall life activities of the sufferer and causing a long-lasting permanent effect on the individuals as well as family members, society as well as nation.

Lifestyle

Lifestyle is characterized as somebody's way of living; the things that an individual or particular group of people typically follow daily in their everyday action.

Pressure ulcer

Pressure ulcer is the injury to skin and underlying tissue resulting from prolonged pressure on the skin with diminished or no sensation. Bedsores mostly develop on skin that covers bony areas of the body, such as the heels, ankles, hips and tailbone.

Traumatic spinal cord injury (TSCI) cause permanent alteration in the anatomical and functional aspects in the human body and leading to a higher morbidity, thus lowering the persons quality of life (QoL) (Geyh et al., 2013). (Cardenas, Hoffman, Kirshblum, & McKinley, 2004) the author states that SCI often results in a very dangerous condition with motor paralysis, sensory loss and followed by many complications. The spinal cord can be affected immediately by physical effects of trauma like road accidents, violence etc., and secondary effects by pathologic processes like pressure ulcers, respiratory complications etc. (Nas, 2015 & Hagen 2015). There is functional deterioration of genitourinary, gastrointestinal and other systems in the body.

Nevertheless, recent advancement in the medical, clinical practice, diagnosis and treatment of SCI with improved understanding of pathophysiology has helped in the better care of the patients (Gassaway et al., 2009). TSCI results in disastrous consequences and disability in a person's life. Biopsychosocial aspects of person are affected, involving their family and society.

(Stensman, 1994) a longitudinal study was conducted in United States to explore the priorities of the patients after spinal cord injury reported that obtaining again the functions of arm and hand for quadriplegics and sexual function for paraplegics were the highest priority and both of the groups emphasized on improvement of bladder and bowel functions. Maintaining the exercise regime was weighted important by the patients but accessibility to trained therapist was an issue. (Haisma et al., 2007) a multicenter longitudinal study reported that the common complications after discharge of in community SCI populations were urinary tract infections and pressure sore. (Sumiya et al., 1997) Spinal cord injured wheelchair users in japan have shown recurrent pressure sore & urinary incontinence due to insufficient pressure sore prevention practice. An undergraduate study conducted in CRP, rehabilitation center in Bangladesh has reported that about 28% of the in-patients are suffering from pressure sore following spinal cord injury (sharmila, 2006). In hospitalized patients, significant risk of pressure development is independently associated with patients who are

confined to bed or chair, with one or more symptoms like redness of a skin over a localized site, lymphocytopenia, not moving around or not mobile, dry or wet skin, and noteworthy reduction in body weight (Allman et al., 1995). Pressure sores development are probably likeable to develop when a high-risk SCI patient are exposed to an equilibrium-disrupting change that end with a specific possibility of pressure sore occurrence. Prevention efforts should be carried to minimize the risk of pressure sore in daily living activities (Clark et al., 2006).

Furthermore, (Morita et al., 2015) emphasizes that these daily living activity choices to prevent pressure sores are affected by various lifestyle risk factors of daily living like wheelchair and cushion factors, protective factors, urination and defecation, and social participation. (Lachenbruch et al., 2016) also stated that for pressure ulcer with full-thickness injuries- urine incontinence was related with a growing risk for every pressure sore development. (Urasaki et al., 2011) study of Japan elderly people with disabilities highlighted the importance of wheelchair cushion. The idea for developing cushions should be considered: low interface pressure with large support area, individual adjustment of sitting position and stability of body trunk.

(Lane et al., 2016) authors have revealed that smokers presented with a greater number of pressure injuries than nonsmokers, as smoking interferes with the wound healing. So, smoking cessation must be advised and observed.

In another study patients who were not self-repositioning during prolonged sitting in wheelchair were at greater risk for developing pressure sore (Stockton & Parker; 2002). While Groah, Schladen, Pineda, & Hsieh (2015) argued that flexible seated positioning and pressure relief maneuver along with patient education is helpful in pressure ulcer prevention.

Inadequate exercise decreases the cardiovascular, muscular and metabolic health; and promote secondary complications in spinal cord injured patients. Inadequate exercise can in long term can impact the occurrence of secondary complications like pressure ulcer in SCI patients (Evans, wingo, sasso, gorgey & harness, 2015). Guiham, Hastings & Garber; 2019 have emphasized the positive role of the therapist in the prevention and treatment of pressure ulcer in the spinal cord injured patients.

The systematic study performed by Krapfl & Gray, 2008 and Gillespie, Chaboyer et al., 2014 where frequent re-positioning the body in bed and while sleeping is related with the prevention of pressure sore development.

The incidence related to contracture in SCI patients are most common and is also a factor with a risk factor for developing pressure ulcer (Diong et al., 2012). Author Dalyan, Sherman & Cardenas in 1998 has found that pressure ulcer was significantly more likely with a contracture than patients without a pressure ulcer ($p=0.05$).

Patients checking their skin for redness or breakdown are at low risk and less likely to develop pressure ulcer. Sheppard & Kennedy in 2006 found similar results where pressure ulcer development and not checking skin were associated; they said knowledge regarding care of skin was negatively correlated with occurrence of pressure sore ($r= -.38, p< .01$).

Morita, Yamada, Wantanbe & Nagahori; 2015, in case control study found that no pressure ulcer group have performed better in pressure relief maneuver than pressure ulcer group. Like previous studies, it is recommended to perform pressure relief maneuver and should be part of patient education (Yang, Chang, Hsu & Chang; 2009).

Amatachya, Wannapakhe, Arrayawichanon, Sriritarathiwat & Wattanapun in 2011 said that complete paraplegic patients reported frequent falls and at least one complication (including) post discharge from rehabilitation.

Morita et al., 2015 in a case-control study found that in a group of SCI patients who did not have pressure ulcer suggested that the patients in the no pressure ulcer group were worried about their cushions and reconditioned them regularly than group in SCI patients with pressure ulcer. Their findings suggests that it is very crucial for patients to know about, be updated and change the cushions.

Rathore, Mansoor in 2013 emphasized that majority of the SCI patients in developing countries are confined to home due to various reasons and are vulnerable to pressure ulcer. The study conducted by Ahmad, Shakil-ur-Rehman & Sibtain in 2013 found that home modification has better outcome in improving quality of life in patients.

Shen, Zheng, Zhang, Zeng & Hou in 2012 noted that intermittent catheter as a most appropriate method of bladder voiding and if clean catheter is used in a recommended schedule can prevent urological complications (Weld & Dmochowski; 2000). Having

a UTI was related with an growing risk for developing pressure ulcer (Joseph & Wikmar; 2016).

Sumiya, Kawamura, Tokuhiko, Takechi & Ogata in 1997 reported that urinary incontinence is the risk factor increasing the pressure sore development. Wilczwesi, Grimm, Giannis, Gill, Sarver & McNett in 2012 also suggested that with incontinence of urine is significantly associated with pressure ulcer development

Wilczwesi, Grimm, Giannis, Gill, Sarver & McNett in 2012 highlighted the fecal management system and its risk and association in development of pressure sore. Similarly, Brandeis, Ooi, Hossain, Morris and Lipsitz in 1994 conducted a longitudinal study which identified the association and risk of fecal incontinence in pressure ulcer development.

(Myers, Lee, & Kiratli,2007) authors have highlighted that cardiovascular disease is a constant issue for SCI patients; comprising of obesity, lipid disorders, metabolic syndromes and diabetes along with autonomic dysreflexia possessing a constant threat. (Ditunno & Formal,1994) author quoted that spasticity, musculoskeletal pain, instability, disuse muscular degeneration, loss in bone density due to inadequate exercise, heterotrophic ossification is presented in the patients following spinal cord injury. (Merritt, 1981) author found that regular stretching exercise can help in reducing spasticity and contractures. (Noreau, 1995) has emphasized on the common benefits of exercise in SCI patients. Exercise helps in the functional reduction of secondary impairments like deprivation of cardiorespiratory and muscular function, metabolic changes and systemic dysfunctions. Decreased exercise continuation will effect on overall quality of life.

A study in Bangladesh showed that patients who depend on wheelchair and discharged from hospital, about one in five are found dead within 2 years of discharge. These deaths were caused by sepsis in pressure ulcer and could be prevented (Hossain et al., 2016).

(Vissers et al.,2008) a study showed patient who were discharged from hospital and living in their communities faced several barriers to health well-being issues: physical and mental issues. The most significant barriers were emotional distress, issues with

self-care, and mental health issues. Much of the time the most reported facilitators were readiness in restoration focus for everyday exercise, participation in daily and social activities and incitement to be physically dynamic. (Lala et al., 2014) a study argued that pressure ulcers decrease the ability of people with SCI to be involved in social and everyday activities. Personal satisfaction is low in people with SCI. Quality of life is also lower in individuals with SCI with pressure ulcers. Higher medicinal use among pressure ulcer, so raising the financial weight to their family

According to the International National Pressure Ulcer Advisory Panel (NPUAP)–European Pressure Ulcer Advisory Panel (EPUAP) Pressure Ulcer Classification System (2009): “A pressure ulcer is a localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure or pressure in combination with shear.

Injury to the skin and underlying tissue most commonly occurs at the sacrum, ischium, heel, or trochanter (Wound Ostomy and Continence Nurses Society, 2006–2011). Positioning patients so that pressure is off these sites is important to prevention.

Essentially all pressure ulcers are caused by pressure of some sort, whether internal, external, or from a medical or personal device. Shear, friction, and moisture do play a part in the development of pressure ulcers. These forces alone or in combination can cause tissue damage (Dziedzic, 2013).

Following is the International NPUAP-EPUAP Pressure Ulcer Classification System

Category/Stage I: Nonblanchable Erythema Category/Stage I involves intact skin with Nonblanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area. The area may be painful, firm soft, warmer or cooler as compared to adjacent tissue. Category/Stage I may be difficult to detect in individuals with dark skin tones. May indicate “at risk” persons.

Category/Stage II: Partial Thickness Skin Loss Partial thickness loss of dermis presenting as a shallow open ulcer with a red-pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister. Presents as a shiny or dry shallow ulcer without slough or bruising. This category/stage should not be used to

describe skin tears, tape burns, perineal dermatitis, maceration, or excoriation. Bruising indicates suspected deep tissue injury.

Category/Stage III: Full Thickness Skin Loss In full thickness tissue loss, subcutaneous fat may be visible but bone, tendon, or muscle is not exposed. Slough may be present but does not obscure the depth of tissue loss. It may include undermining or tunneling. The depth of a Category/Stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput, and malleolus do not have subcutaneous tissue and Category/Stage III ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep Category/Stage III pressure ulcers. Bone/tendon is not visible or directly palpable.

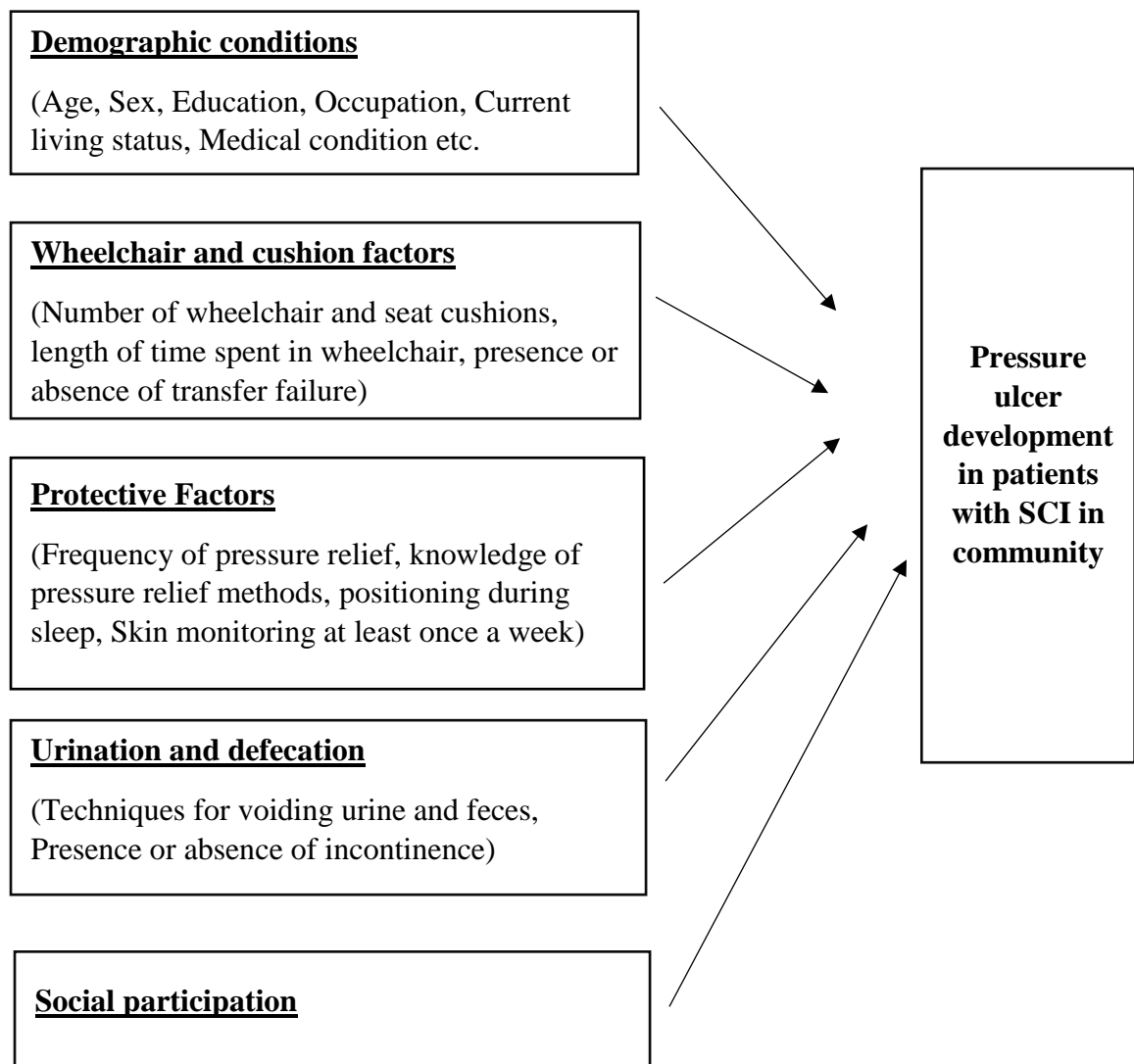
Unstageable: Depth Unknown This is full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green, or brown) and/ or eschar (tan, brown, or black) in the wound bed. Until enough slough and/or eschar is removed or exposed, the base of the wound, the true depth, and, therefore, the category/stage cannot be determined. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as “the body’s natural (biological) cover” and should not be removed.

3.1. Conceptual framework

Predictive Variables

Response

Variables



3.2. Objectives of the study

3.2.1 General objective

- To study the associations between selected daily living lifestyles factors and pressure ulcer development in adults with spinal cord injury (SCI).

3.2.2 Specific objectives

- 1) To identify which major lifestyle risk factors contributed in development of pressure sore in community-living patients with SCI.
- 2) To identify which major lifestyle protective factors contributed in prevention of pressure sore in community-living patients with SCI.
- 3) To identify the association of different demographic factors with pressure sore development.

3.3. Study design

This study is a case-control study because it is effective design to find lifestyle factors affecting in development of pressure ulcer, where the cases are spinal cord injury patients with pressure ulcer and control are spinal cord injury patients with no pressure ulcer. The control group was included without matching with the group case, so it is unmatched 1:1 case control study. The participants who were willing to participate in this study were included till the total number of 40 subjects in each group were reached. The odd ratios were used to measure association between risk (exposure) and outcomes. The odd ratios are measured by relative magnitude of odds of exposure among individuals those who had pressure ulcer (case) in past years and odds of exposure who had no pressure ulcer (control) from 2×2 table as below.

Exposure	a	b
	c	d

Odds of exposure among case = a/c

Odd of exposure among control = b/d

Odd ratio = $\frac{a/c}{b/d}$

3.4. Study Population

In this study, the study population had included SCI patients who acquired pressure sore in case group and SCI population without pressure sore in control group in community post-discharge following rehabilitation program in Bangladesh.

3.5. Study area/site

The study had conducted at community level in Bangladesh and re-admitted patients with pressure sore in CRP, Savar, Bangladesh. Centre for the Rehabilitation of the Paralyzed (CRP) which is one of the largest rehabilitation centers for the spinal cord injury in Bangladesh.

3.6. Study Period

The study was conducted from August, 2018 to December, 2018.

3.7. Sample size

Sample size was determined according to following criteria: 50% prevalence of patient with Spinal Cord Injury because researcher has not accurate data about the prevalence of Spinal Cord Injury in Bangladesh. The confidence interval was 95% and 5% error level.

The formulation of sample size determination:

$$n = \frac{(r+1) (P) (1-P) (Z_{\beta} + Z_{\alpha/2})^2}{r (P_1 - P_2)}$$

$$r (P_1 - P_2)$$

$$n = \frac{Z^2 P (1-P)}{d^2}$$

$$d^2$$

The use of prevalence with the precision half of prevalence gives the sample size of 640 (case=160 and control 480). Which may not be possible to collect from selected sample. On researcher's convenience, precision is made 10% with the assumed 50% prevalence which resulted sample size of 120 (case= 30 and control 120). The study in community case and control group was very high. Therefore, the achievable sample size for control group 40 and for the case group 40 with total sample size of 80 spinal cord injured patients living in community was determined.

3.8. Inclusion and exclusion criteria

Inclusion Criteria:

- Patients of both gender
- Age ranges from 18-71 years old.
- Patients with paraplegia only.
- Patient residing in community with/ without developed pressure ulcer

- re-hospitalized cases with pressure ulcer cases from community.
- With traumatic spinal cord injury below T1 level
- Those who have completed more than 2 months rehabilitation in an inpatient center and have been discharged to community.

Exclusion Criteria:

- Patients who have mental disorders. Patients with neurologic diseases (e.g. MS, ALS).
- Those who are in 24 hours mechanical ventilation dependency.
- Patients with age range below 18 years and above 71 years.
- Above T2 level Tetraplegic.
- subjects that are dependent for wheel chair propulsion and transferring.

3.9. Sampling Technique

The researcher had used Purposive sampling method. The reason of choosing this method is to include number of subjects based on developed inclusion and exclusion criteria. It is known as Judgmental, selective or subjective sampling and is also a type of non-probability sampling. The researcher had selected this technique as it is the easiest and quickest method of sample selection.

3.10. Data collection tools/ materials

The data were collected by using Spinal Cord Injury Lifestyle Scale (SCILS) questionnaire. Each participant took part in interview for lasting approximately 10-15 minutes and some more than 20 minutes. All the information required for the study were obtained by face to face interaction with patient with the help of secondary information sources i.e. patient demographic data, hospital record, inquiry etc. Pilot testing was performed before the actual data collection.

The questionnaire had contained two parts.

- First part of questionnaire had contained demographic detailed of the respondent.
- Second part had contained the structure questionnaire from the SCILS. The details of each section will be explained as follows:

Section 1: Demographic Questionnaire

This questionnaire consisted of 9 items to assess the subjects' demographic data including age, gender, marital status, basic education, job, causes of injury, level of injury and types of injury (Appendix B).

Section 2: Spinal Cord Injury Lifestyle Scale (SCLIS)

This questionnaire assesses the level of patients' The Spinal Cord Injury Lifestyle Scale (SCILS) measures the frequency of health-related behavior performance in individuals with SCI. It is designed to examine the effectiveness of clinical and educational efforts for health maintenance and prevention of secondary impairments. The 5 subscales include: 1) Cardiovascular; 2) Genitourinary; 3) Neuromuscular; 4) Skin; and 5) Psychosocial. A score is generated for each subscale by totaling scores of each item in the subscale. The frequency with which each behavior has been performed over the past 3 months is rated using an ordinal scale where 4- 'almost always', 3- 'frequently', 2- 'sometimes', 1- 'rarely' and 0- 'never'. One item (genitourinary) is reverse scored. A total score ranging from 0-100 is calculated by summing the 5 subscales. scores. A total score ranging from 0-100 is calculated by summing the 5 subscale scores.

Regarding to the reliability, Cronbach's $\alpha = 0.81$ and for the Subscales: Cardiovascular = 0.73, Genitourinary = 0.32, Neuromusculoskeletal = 0.75, Skin = 0.86, Psychosocial = 0.32.

Subscale to total: Cardiovascular: $r=0.40$ ($P<.01$, two tailed), Genitourinary: $r=0.42$ ($P<.01$, two tailed), Neuromuscular: $r=0.88$ ($P<.001$, two tailed), Skin: $r=0.79$ ($P<.001$, two-tailed), Psychosocial: $r=0.10$ (ns).

3.11. Data management and analysis

Data collection and analysis were carried out in an iterative manner. Descriptive statistics were used to analyze the data. The demographic data like age, gender, education along with different variables were entered into the SPSS and was re-coded as required. For example, the age was re-coded as age groups as 18-27 as 1 and 28-37 as 2 and so on.

All the data were put in Statistical Package for Social Science (SPSS) and Microsoft excel through different variables.

3.12. Quality control and assurance

Questionnaire was to assess the patient's lifestyle factors influencing pressure ulcer development in the community after SCI. To ensure and improve the quality of the study, first questionnaire was translated in the national language that is Bangla language following the standard procedure of linguistic validation.

For translation, two individual who were fluent in both languages were assigned for forward translation. They both prepare two versions of questionnaires then they both sat together and discussed and come up with one first version of translated questionnaire. Then this translated version was provided to another person who was fluent in both languages and who have not seen the original copy of questionnaire for backward translation. Then all three translators sat together and consensus was drawn with final version of translated questionnaires in Bangla language.

Then the pilot study had been conducted for the questionnaire to ensure the validity of the questionnaire. With the help of this survey, the unmet and required changes can be made and rearrange the questionnaire to make it easiest, understandable, and clear to the participants. The questionnaires filled by all those participants were kept safely in other to maintain confidentiality of participants. The data collected had been reviewed several times before entering into the SPSS program to reduce the errors that are likely to occur while entering and analysis of the collected data. The data were being re-coded in the required variables. Analysis of the data was done from the computer to minimize the errors.

3.13. Ethical Consideration

Study was conducted following the standard guidelines for ethical consideration. First, prepared research proposal was submitted to the concerning authority after getting approval from course coordinator of Department of Masters in Rehabilitation Science and supervisor. The ethical approval had been taken from the Institutional Review Board (IRB) of Bangladesh Health Professions Institution (BHPI) for the conduction of the study. The researcher obtained permission from the Ethical Committee of BHPI. The researcher obtained permission from the Head of Spinal Cord Injury Department.

The respondents from the study was told clearly about their right to leave or not forced to participant if he/she was not willing to participate in the study. The researcher had taken appropriate informed consent from the participants who were interested to participate in the study and then informed verbally about the study and its purpose. Confidentiality of the information provided by the participants will not be revealed directly. They were being informed that there will not be any harm and direct benefit to participate in the study.

4.1 Socio demographics

Table 4.1 Frequency distribution of Socio demographic data

Variables	Case N=40	Control N=40	Total N= 80
Age of the participants			
18-27 years	13 (16.3%)	20 (25%)	33 (41.3%)
28-37 years	10 (12.5%)	15 (18.8%)	25 (31.3%)
38-47 years	5 (6.3%)	3 (3.8%)	8 (10%)
48-57 years	10 (12.5%)	2 (2.5%)	12 (15%)
58-76 years	2 (2.5%)	0 (0%)	2 (2.5%)
Gender			
Female	9 (11.25%)	19 (23.75%)	28 (35%)
Male	31 (38.75%)	21 (26.25%)	52 (65%)
Marital status			
Unmarried	13 (16.3%)	17 (21.3%)	30 (37.5%)
Married	23 (28.7%)	21 (26.3%)	44 (55%)
Divorced	3 (3.8%)	2 (2.5%)	5 (6.3%)
Widow	1 (1.3%)	0 (0%)	1 (1.3%)
Living area			
Urban	13 (16.3%)	10 (12.5%)	23 (28.7%)
Semi-Urban	4 (5%)	1 (1.3%)	5 (6.3%)
Rural	22 (27.5%)	28 (35%)	50 (62.5%)
Religion			
Islam	38 (47.5%)	39 (48.8%)	77 (96.3%)

Hindu	2 (2.5%)	1 (1.3%)	3 (3.8%)
Family size			
Small	23 (28.7%)	22 (27.5%)	45 (56.2%)
Large	17 (21.3%)	18 (22.5%)	35 (43.8%)
Duration of injury (years)			
0-10	26 (32.5%)	29 (36.3%)	55 (68.8%)
11-20	12 (15%)	7 (8.8%)	19 (23.8%)
21-30	0 (0%)	3 (3.8%)	3 (3.8%)
31-40	2 (5%)	1 (1.3%)	3 (3.8%)
Level of injury			
T ₂ -T ₅	5 (6.3%)	3 (3.8%)	8 (10%)
T ₆ -T ₉	12 (15%)	11 (13.8%)	23 (28.7%)
T ₁₀ -T ₁₂	17 (21.3%)	17 (21.3%)	34 (42.5%)
L ₁ -L ₄	6 (7.5%)	9 (11.3%)	15 (18.8%)
Education status			
Illiterate	9 (11.3%)	8 (10%)	17 (21.3%)
Primary	11 (13.8%)	11 (13.8%)	22 (27.5%)
Secondary	4 (5%)	8 (10%)	12 (15%)
SSC	9 (11.3%)	2 (2.5%)	11 (13.8%)
Diploma	0 (0%)	1 (1.3%)	1 (1.3%)
HSC	2 (2.5%)	6 (7.5%)	8 (10%)
Bachelors	4 (5%)	3 (3.8%)	7 (8.8%)
Masters	1 (1.3%)	1 (1.3%)	2 (2.5%)

In Table 4.1, the data shows that in total 80 participants. In case group, 13 (16.3%), 10 (12.5%), 5 (6.3%), 10 (12.5%) and 2 (2.5%) participants were between age group 18-27, 28-37, 38-47, 48-57 and 58-76 respectively. In control group 20 (25%), 15 (18.8%), 3 (3.8%), 2 (2.5%) and 0 (0%) participants were between age group 18-27, 28-37, 38-47, 48-57 and 58-76 respectively.

The total mean age of the participants was 32.63 ± 12.20 . In case group, mean age was 36.68 ± 13.33 and in control group mean age was 28.58 ± 9.5 .

As in above table 4.1, 9 (11.3%) were female and 31 (38.8%) were males within case group. The control group had 19 (23.8%) females and 21 (26.3%) males among 80 participants. Male participants were more in both the groups.

The data showed that 13 (16.3%) in case group and 17 (21.3%) in control group were unmarried. In married subgroup, 23 (28.7%) were in case group and 21 (26.3%) were in control group. Likewise, 3 (3.8%) were in case group and 2 (2.5) in control were found divorced. There was only 1 (1.3%) widow in case group and 0 (0%) in control group. Most of the participants were married in both groups.

Among 80 participants, the data showed that within case group 13 (16.3%), 4 (5%) and 22 (27.5%) were living in urban, semi-urban and Rural are respectively.

Likewise, within control group 10 (12.5%), 1 (1.3%) and 28 (35%) were living in urban, semi-urban and rural area respectively. The data revealed that in both the groups participants were living in rural area.

The data showed that most of the participants were following Islam. There were 38 and 2 participants Islam and Hindu respectively in case group. Likewise, 39 and 1 participant were Islam and Hindu respectively in control group.

Among 80 respondents, in case group 23 and 17 respondents were living in small and large family respectively. Similarly, in control group 22 and 18 respondents were living in small and large family respectively.

The data showed that duration of injury case group had 26 (32.5%), 12 (15%), 0 and 2 (5%) respondents had SCI injury from 0-10, 11-20, 21-30 and 31-40 years respectively. Likewise, in control group 3 (3.8%), 11 (13.8%), 17 (21.3%) and 9 (22.5%) respondents had SCI injury had SCI injury from 0-10, 11-20, 21-30 and 31-40 years respectively.

Among 80 participants, in case group 5 (7.5%), 12 (15%), 17 (21.3%) and 6 (7.5%) participants had T2-T5, T6-T9, T10-T11 and L1-L4 spinal cord injury respectively. Similarly, in control group 3 (3.8%), 11 (13.8%), 17 (21.3%) and 9 (11.3%) participants had T2-T5, T6-T9, T10-T11 and L1-L4 spinal cord injury respectively.

The data showed that in case group education status of participants were 9 (11.3%), 11 (13.8%), 4 (5%), 9 (11.3%), 0 (0%), 2 (2.5%), 4 (5%) and 1 (1.3%) for illiterate, primary, secondary, SSC, diploma, HSC, bachelor and masters respectively.

Similarly, in control group education status of participants were 8 (10%), 11 (13.8%), 8 (10%), 2 (2.5%), 1 (1.3%), 6 (7.5%), 3.8 (3%) and 1 (1.3%). for illiterate, primary, secondary, SSC, diploma, HSC, bachelor and masters respectively.

4.1.1 Duration of pressure ulcer development

Figure 4.1 shows the duration of recent pressure ulcer development in case group after going to community. The data shows the participants had pressure ulcer from 0-10 months 62.5%, 11-20 months 32.5%, 21-30 months 2.5% and 31-40 months 2.5%.

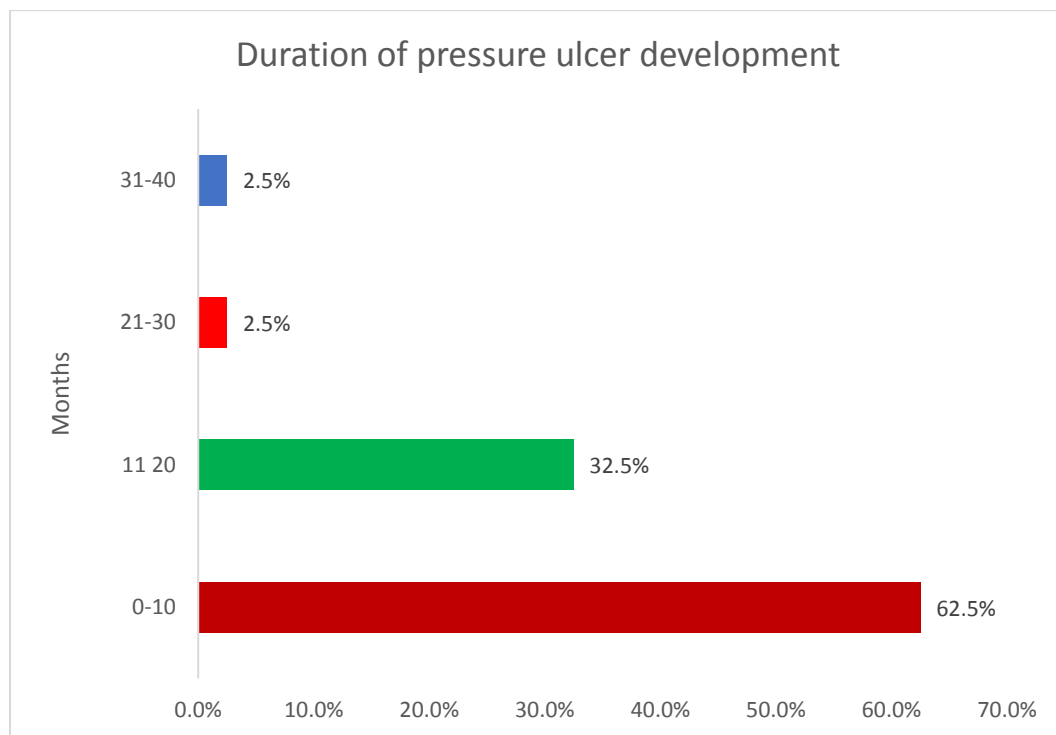


Figure 4.1 Duration of pressure ulcer development in case group

4.1.2 Occupation

In figure 4.2 shows the occupation of the participants in case and control group. In case group, 3.8%, 11.3%, 5%, 10%, 17.3% and 2.5% participants were farmer, daily laborer, service holder, businessman, with no job and student respectively. In control group, 1.3%, 13.8%, 12.5%, 1.3%, 13.8% and 7.5% participants were farmer, daily laborer, service holder, businessman, with no job and student respectively. Majority

of participants in case group were with no job and in control group were daily laborer and with no job.

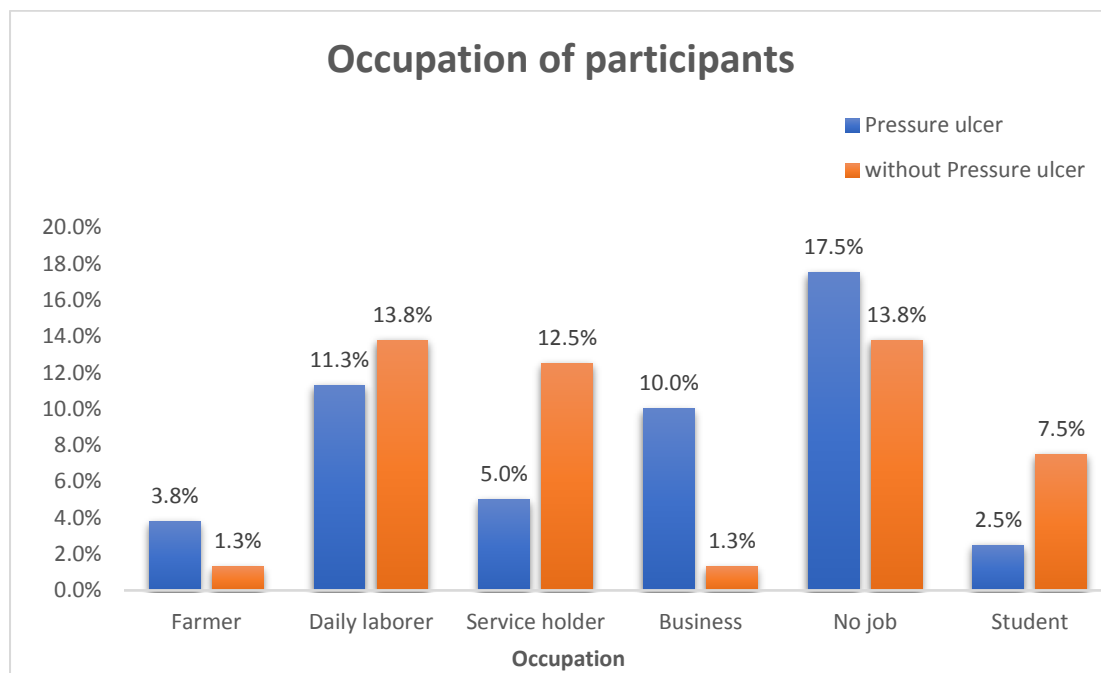


Figure 4.2 Occupation of participants

4.2 Case-control group and association with subgroups

Table 4.2.1: Association of cardiovascular factors and case-control group

Exposure	Case (%)	Control (%)	Chi square	P values	Odds ratio	95% of CI	
						L/L	U/L
1. Cardiovascular factors							
1.1 I avoid smoking cigarettes.			13.095	0.000	0.174	0.065	0.464
Yes	32.6%	67.4%					
No	73.5%	26.5%					

1.2 I limit the amount of fat and cholesterol in my diet (for example, I limit red meats, dairy products).						
		1.289	0.256	0.595	0.242	1.462
Yes	42.4%	57.6%				
No	55.3%	44.7%				
1.3 I am aware of and try to reduce my risk for heart disease.						
		3.647	0.056	0.393	0.149	1.038
Yes	42.6%	57.4%				
No	65.4%	34.6%				
1.4 I monitor my blood pressure on a regular basis.						
		3.516	0.61	0.407	0.158	1.052
Yes	35.7%	64.3%				
No	57.7%	42.3%				

In table 4.2.1, the data reveals that among 80 participants, in case group 73.5% people were found to be smoking in case group, while 67.5% were avoiding smoking in control group. At 95% level of significance chi- square value was 1.96. The observed value was $X^2 = 13.01$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. That means patients who did not avoid smoking cigarettes have higher chances of pressure ulcer.

Here at 95% of CI= 0.065-0.464 and OR= 0.174. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.17) = .83$ times more protective. This means patient who avoid smoking cigarettes have .83 times more protection from pressure ulcer.

In table 4.2, among 80 participants, in case group 42.4% had limited the amount of fat and cholesterol in diet and 55.3% did not limit. The control group had 57.6% were limiting and 44.7 % were not limiting fat and cholesterol in their diet. The odd ratio is 0.595 with 95% CI, ranging from .24 (LL) to 1.46 (UL). The percentage of pressure ulcer didn't differ by limiting the fat and cholesterol in diet, $\chi^2 (1, N=80) = 1.289, p = .26$. The result is statistically insignificant and failed to reject null hypothesis. This indicates that there is no enough evidence that not limiting the amount of fat and cholesterol in diet contribute in pressure ulcer development.

In table 4.2, among 80 participants, in case group 42.6% were aware of and try to reduce risk for heart disease and 65.4% were not aware. The control group had 57.4% were aware and 34.6 % were not aware of and try to reduce risk for heart disease. The odd ratio is .393 with 95% CI, ranging from .15 (LL) to 1.04 (UL). The percentage of pressure ulcer didn't differ by were aware of and try to reduce risk for heart disease, $\chi^2 (1, N=80) = 3.647, p = .056$. The result is statistically insignificant and failed to reject null hypothesis. This indicates that there is no enough evidence that patient who were not aware of and try to reduce risk for heart disease contribute in pressure ulcer development.

In table 4.2, among 80 participants, in case group 35.7% monitored blood pressure on a regular basis and 57.7% did not monitor. The control group had 64.3% were monitoring and 42.3% did not monitor blood pressure on a regular basis and 57.7% did not monitor. The odd ratio is .407 with 95% CI, ranging from .16 (LL) to 1.05 (UL). The percentage of pressure ulcer didn't differ by monitoring blood pressure on regular basis, $\chi^2 (1, N=80) = 3.516, p = .407$. The result is statistically insignificant and failed to reject null hypothesis. This indicates there is no evidence that patient who were not monitoring blood pressure on a regular basis contribute in pressure ulcer development.

4.2 Case-control group and association with subgroups

Table 4.2.2 Association of Neuromusculoskeletal factors and case-control group

Exposure	Case (%)	Control (%)	Chi square	P values	Odds ratio	95%of CI	
						L/L	U/L
2. Neuromusculoskeletal factors							

2.1 I do range of motion exercises daily to keep my joints flexible.			21.333	0.000	0.086	0.028	0.267
Yes	30%	70%					
No	83.3%	16.7%					
2.2 I do exercises that enhance my muscle strength (for example, weight training) at least 3 times a week.			21.978	0.000	0.074	0.22	0.249
Yes	30.8%	69.2%					
No	85.7%	14.3%					
2.3 My muscle strengthening exercises are monitored by a therapist at least once a year.			26.467	0.000	0.073	0.025	0.212
Yes	22%	78%					
No	79.5%	20.5%					
2.4 I allow my shoulder joints to rest when I am having pain from overusing them.			1.317	0.251	0.588	0.237	1.460
Yes	44.9%	55.1%					
No	58.1%	41.9%					
2.5 I do activities which put weight on the bones in my legs to help increase bone density about 3 times a week (for example, use standing frame).			28.614	0.000	0.044	0.03	0.27
Yes	27.5%	72.5%					
No	89.7%	10.3%					

2.6 I pay attention to the position my body is in when I am in my wheelchair.			21.587	0.000	0.365	0.264	0.506
Yes	36.5%	63.5%					
No	100%	0%					
2.7 I pay attention to the position my body is in when I am sleeping.			11.250	0.001	0.098	0.020	0.447
Yes	40.6%	59.4%					
No	87.5%	12.5%					
2.8 If I noticed beginning of a contracture (a joint that is 'freezing up'), I would know exactly what to do.			14.907	0.00	0.150	0.055	0.410
Yes	31.9%	68.1%					
No	75.8%	24.2%					

In table 4.2.2, the data reveals that among 80 participants, in case group 30% people were doing range of motion exercises daily to keep joints flexible in case group and 83.3% were not doing. In control group 70% were doing and 16.7% were not doing range of motion exercise daily. At 95% level of significance chi- square value was 1.96. The observed value was $X^2 = 21.33$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p=0.000$). That means patients who were not doing range of motion exercises daily to keep joints flexible have higher chances of pressure ulcer.

At 95% of CI= 0.028-0.267 and OR= 0.086. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.09) = .91$ times more protective. This means patient who were doing range of motion exercises daily to keep joints flexible have .91times more protection from pressure ulcer.

In table 4.2.2, the data reveals that among 80 participants, in case group 30.8% people were doing exercises that enhance muscle strength at least 3 times a week in case group and 85.7% were not doing. In control group 69.2% were doing and 14.3% were not doing exercises that enhance muscle strength at least 3 times a week. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 21.978$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p=0.000$). That means patients who were not doing exercises that enhance muscle strength at least 3 times a week have higher chances of pressure ulcer.

At 95% of CI= 0.028-0.267 and OR= 0.074. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.07) = .93$ times more protective. This means patient who were doing exercises that enhance muscle strength at least 3 times a week have .93 times more protection from pressure ulcer.

In table 4.2.2, the data reveals that among 80 participants, in case group 22% people muscle strengthening exercises were monitored by a therapist at least once a year in case group and 79.5% were not monitored. In control group 78% were monitored and 20.5% muscle strengthening exercises were not monitored by therapist at least once a year. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 26.467$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p=0.000$). That means patients whose muscle strengthening exercises are not monitored by a therapist at least once a year have higher chances of pressure ulcer.

At 95% of CI= 0.025-0.212 and OR was 0.073. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.07) = .93$ times more protective. This means patient who were muscle strengthening exercises are monitored by a therapist at least once a year have .93 times more protection from pressure ulcer.

In table 4.2.2, among 80 participants, in case group 44.9% participants allow shoulder joints to rest when having pain from overusing them and 58.1% did not rest. The control group had 55.1% were allowing rest and 41.9% did not allow shoulder joints to rest when having pain from overusing them. The odd ratio is .588 with 95% CI, ranging from .28 (LL) to 1.46 (UL). The percentage of pressure ulcer didn't differ by allowing shoulder joints to rest when having pain from overusing them, $X^2 (1, N=80) = 1.317$,

$p = .251$. The result is statistically insignificant and failed to reject null hypothesis. This indicates that there is no evidence that patient who do not allow shoulder joints to rest when having pain from overusing develop pressure ulcer.

In table 4.2.2, the data reveals that among 80 participants, in case group 27.5% participants were doing activities which put weight on the bones in legs to help increase bone density about 3 times a week in case group and 89.7% were not doing. In control group, 72.5% were doing and 10.3% were not doing activities which put weight on the bones in legs to help increase bone density about 3 times a week. At 95% level of significance chi-square value was 1.96. The observed value was $X^2 = 28.614$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p = 0.000$). That means patients not doing activities which put weight on the bones in legs to help increase bone density about 3 times a week have higher chances of pressure ulcer.

At 95% of CI = 0.03-0.27 and OR = 0.044. Here odd ratio is less than 1, that means it is a protective factor which is $(1 - 0.04) = .96$ times more protective. This means patient who were doing activities which put weight on the bones in legs to help increase bone density about 3 times a week have .96 times more protection from pressure ulcer.

In table 4.2.2, the data reveals that among 80 participants, in case group 36.5% people pay attention to position body in wheelchair and 100% did not pay attention to position body in wheelchair. In control group 63.5% were paying attention to position body in wheelchair and 0% were not paying attention to position body in wheelchair. At 95% level of significance chi-square value was 1.96. The observed value was $X^2 = 21.587$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p = 0.000$). That means patients not paying attention to position body in wheelchair have higher chances of pressure ulcer.

At 95% of CI = 0.03-0.27 and OR = 0.365. Here odd ratio is less than 1, that means it is a protective factor which is $(1 - 0.37) = .63$ times more protective. This means patient who pay attention to position body in wheelchair have .63 times more protection from pressure ulcer.

In table 4.2.2, the data reveals that among 80 participants, in case group 40.6% people pay attention to position body while sleeping and 87.5% did not pay attention to

position body while sleeping. In control group 59.4% were paying attention to position body while sleeping and 12.5% were not paying attention to position body while sleeping. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 11.25$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p=0.000$). That means patients not paying attention to position body while sleeping have higher chances of pressure ulcer.

At 95% of CI= 0.02-0.447 and OR= 0.098. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.1) = .90$ times more protective. This means patient who pay attention to position body while sleeping have .90 times more protection from pressure ulcer.

In table 4.2.2, the data reveals that among 80 participants, in case group 31.9% people know exactly what to do when beginning of contracture and 75.8% did not know exactly what to do when beginning of contracture. In control group 68.1% know exactly what to do when beginning of contracture and 24.2% did not know exactly what to do when beginning of contracture. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 14.907$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p=0.000$). That means patients who did not know exactly what to do when beginning of contracture have higher chances of pressure ulcer.

At 95% of CI= 0.055-0.410 and OR= 0.15. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.15) = .85$ times more protective. This means patient who pay attention to position body while sleeping have .85 times more protection from pressure ulcer.

Table 4.2.3 Association of skin factors and case-control group

Exposure	Case (%)	Control (%)	Chi square	P values	Odds ratio	95%of CI	
						L/L	U/L
3. Skin factors							
3.1 I check my skin to look for any areas of redness or breakdown.			21.587	0.000	0.365	0.264	0.506

Yes 36.5% 63.5%

No 100% 0%

3.2 I do some type of pressure relief every 30 minutes any time I am in my chair or driving.

33.9% 66.1% 19.286 **0.000** 0.073 0.019 0.277

Yes

87.5% 12.5%

No

3.3 I am careful not to bump my legs, feet, or buttocks when doing transfers.

16.807 **0.000** 0.038 0.05 0.309

Yes 38.1% 61.9%

No 94.1% 5.9%

3.4 I wear something on my feet when I am out of bed (for example, shoes or foam boots)

14.528 **0.000** 0.099 0.026 0.375

Yes 37.3% 62.7%

No	85.7%	14.3%					
3.5 I am careful when handling hot liquids by not carrying them in my lap.							
			2.489	0.115	0.487	0.198	1.196
	47.5%	65%					
Yes	52.5%	35%					
No							
3.6 I am aware of the condition of my wheelchair cushion.							
			11.114	0.01	0.060	0.007	0.487
Yes	41.8%	58.2%					
No	92.3%	7.7%					
3.7 I am aware of the condition and repair needs of my wheelchair.							
			1.978	0.160	0.513	0.201	1.308
	44.2%	55.8%					
Yes	60.7%	39.3%					
No							

In table 4.2.3, the data reveals that among 80 participants, in case group 36.5% people check their skin to look for any areas of redness or breakdown and 100% did not check their skin to look for any areas of redness or breakdown. In control group 63.5% check their skin to look for any areas of redness or breakdown and 0% did not check their skin to look for any areas of redness or breakdown. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 21.587$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. The result was statistically significant ($p=0.00$). That means patients who did not check their skin to look for any areas of redness or breakdown have higher chances of pressure ulcer.

And CI= 0.264-0.506 and OR was 0.365. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.37) = .63$ times more protect. This means patient who check their skin to look for any areas of redness or breakdown .63 times more protection from pressure ulcer.

In table 4.2.3, the data reveals that among 80 participants, in case group 32.9% people do some type of pressure relief every 30 minutes and 67.1% did not do some type of pressure relief every 30 minutes. In control group 66.1% do some type of pressure relief every 30 minutes and 33.9% did not do some type of pressure relief every 30 minutes. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 18.286$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. The result was statistically significant ($p=0.00$). That means patients not doing some type of pressure relief every 30 minutes have higher chances of pressure ulcer.

And CI= 0.019-0.277 and OR was 0.073. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.07) = .93$ times more protect. This means patient doing some type of pressure relief every 30 minutes have .93 times more protection from pressure ulcer.

In table 4.2.3, the data reveals that among 80 participants, in case group 38.1% people are careful not to bump legs, feet, or buttocks when doing transfers and 61.9% people are not careful not to bump legs, feet, or buttocks when doing transfers. In control group 61.9% are careful not to bump my legs, feet, or buttocks when doing transfers and 38.1% people are not careful not to bump legs, feet, or buttocks when doing transfers. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 16.807$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. The result was statistically significant ($p=0.00$). That means patients who are not careful not to bump legs, feet, or buttocks when doing transfers have chances of pressure ulcer.

And CI= 0.05-0.309 and OR was 0.38. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.38) = .62$ times more protect. This means patient who are careful not to bump legs, feet, or buttocks when doing transfers have .62 times more protection from pressure ulcer.

In table 4.2.3, the data reveals that among 80 participants, in case group 38.1% people wear something on feet when out of bed and 85.7% people do not wear something on feet when out of bed. In control group 62.7% people wear something on feet when out of bed and 14.3% people do not wear something on feet when out of bed. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 14.528$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. The result was statistically significant ($p=0.00$). That means patients who do not wear something on feet when out of bed have chances of pressure ulcer.

And CI= 0.026-0.375 and OR was 0.099. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.1) = .90$ times more protection. This means patient who wear something on feet when out of bed have .62 times more protection from pressure ulcer.

In table 4.2.3, the data reveals that among 80 participants, in case group 47.5% people were aware of were careful when handling hot liquids by not carrying them in lap and 52.5% people were not were careful when handling hot liquids by not carrying them in lap. In control group 65% people were careful when handling hot liquids by not carrying them in lap and 35% people were not careful when handling hot liquids by not carrying them in lap. The percentage of pressure ulcer was differed by aware of the condition and repair needs of wheelchair, $X^2 (1, N=80) = 1.987$, $p= 0.115$. The result is not statistically significant and failed to reject null hypothesis. This indicates there is not enough evidence that not being careful while handling hot liquids on lap contribute in pressure ulcer development.

In table 4.2.3, the data reveals that among 80 participants, in case group 41.8% people were aware of the condition of wheelchair cushion and 92.3% people were not aware of the condition of wheelchair cushion. In control group 58.2% people were aware of the condition of wheelchair cushion and 7.7% people were not aware of the condition of wheelchair cushion. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 11.114$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. The result was statistically significant ($p=0.01$). That means patients who were not aware of the condition of wheelchair cushion have chances of pressure ulcer.

At 95% of CI= 0.007-0.487 and OR= 0.06. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.6) = .40$ times more protection. This means patient who were aware of the condition of wheelchair cushion have .40 times more protection from pressure ulcer.

In table 4.2.3, the data reveals that among 80 participants, in case group 44.2% people were aware of the condition and repair needs of wheelchair and 60.7% people were not aware of the condition and repair needs of wheelchair. In control group 55.8% people were aware of the condition and repair needs of wheelchair and 39.3% people were not aware of the condition and repair needs of wheelchair. The percentage of pressure ulcer was differed by aware of the condition and repair needs of wheelchair, $X^2(1, N=80) = 1.987$, $p= 0.168$. The result is not statistically significant and failed to reject null hypothesis. This indicates that there is no enough evidence that patient who were not aware of the condition and repair needs of wheelchair have chances of pressure ulcer development.

Table 4.2.4 Association of psychological factors and case-control group

Exposure	Case (%)	Control (%)	Chi square	P values	Odds ratio	95% of CI L/L U/L	
4. Psychological factors							
4.1 I am able to get around in my house (my house is wheelchair accessible).			18.462	0.000	0.091	0.027	0.304
Yes	33.3%	66.7%					
No	84.6%	15.4%					
4.2 I am with or talk to other people at least once a day.	52.2%	47.8%	0.827	0.363	1.750	0.519	5.903
Yes	38.5%	61.5%					
No							

In table 4.2.4, the data reveals that among 80 participants, in case group 33.3% people were able to get around in house in wheelchair and 84.6% people were not able to get

around in house in wheelchair. In control group 66.7% people were able to get around in house in wheelchair and 15.4% people were not able to get around in house in wheelchair. At 95% level of significance chi- square value was 1.96. The observed value was $X^2= 18.462$ which is greater than table value. This is statistically significant ($p=0.000$). That means null hypothesis was rejected and alternative hypothesis was accepted. That means patients were not able to get around in house in wheelchair have higher chances of pressure ulcer.

At 95% of CI= 0.027-0.304, OR was 0.091. Here odd ratio is less than 1, that means it is a protective factor which is $(1-0.09) = .91$ times more protective. This means patient who were able to get around in house in wheelchair have .91 times more protection from pressure ulcer.

In table 4.2.4, the data reveals that among 80 participants, in case group 44.2% people were with or talk to other people at least once a day and 60.7% people were not with or talk to other people at least once a day. In control group 55.8% people were with or talk to other people at least once a day and 39.3% people were not aware of the condition and repair needs of wheelchair. The percentage of pressure ulcer was not differed by being with or talk to other people at least once a day, $X^2 (1, N=80) = 1.987, p= 0.168$. The result is not statistically significant and failed to reject null hypothesis. This indicates that there is no enough evidence that not being with or talk to other people at least once a day contribute in pressure ulcer development.

Table 4.2.5 Association of Genitourinary factors and case-control group

Exposure	Case (%)	Control (%)	Chi square	P values	Odds ratio	95%of CI	
						L/L	U/L
5. Genitourinary factors							
5.1 I use an intermittent catheterization program and stick to the recommended schedule.							
Yes	43.3%	56.7%	4.267	0.039	0.328	0.111	0.969
No	70%	30%					

5.2 I change my catheters as often as I have been directed to.			5.591	0.018	0.265	0.085	0.830
	42.6%	57.4%					
Yes							
	73.7%	26.3%					
No							
5.3 I have episodes of bladder incontinence.			4.053	0.044	2.500	1.016	6.149
	61%	39%					
Yes							
	38.5%	61.5%					
No							
5.4 I use a rectal suppository as part of my regular bowel program.			13.067	0.000	0.110	0.029	0.416
	15%	85%					
Yes							
	61.7%	38.3%					
No							

In table 4.2.5, the data reveals that among 80 participants, in case group 43.3% people use an intermittent catheterization program and stick to the recommended schedule. and 70% people were not using an intermittent catheterization program and stick to the recommended schedule. In control group 56.7% people use an intermittent catheterization program and stick to the recommended schedule and 30% people were not use an intermittent catheterization program and stick to the recommended schedule. At 95% level of significance chi- square value was 1.96. The observed value was $X^2=4.267$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p= 0.039$). That means patients who do not use an intermittent catheterization program and stick to the recommended schedule have higher chances of pressure ulcer.

Here at 95% of CI= 0.111-0.969, the OR= 0.328 which is less than 1, that means it is a protective factor which is $(1-0.33) = .67$ times more protective. This means patient

who use an intermittent catheterization program and stick to the recommended schedule have .67 times more protection from pressure ulcer.

In table 4.2.5, the data reveals that among 80 participants, in case group 42.6% people change catheters as often as have been directed and 73.7% people did not change catheters as often as directed. In control group 57.6% people change catheters as often as directed and 26.3% people did not change catheters as often as directed.

At 95% level of significance chi- square value was 1.96. The observed value was $X^2=5.591$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p=0.018$). That means patients who do not change catheters as often as have been directed have higher chances of pressure ulcer.

Here at 95% of CI= 0.085-0.830, the OR= 0.265 which is less than 1, that means it is a protective factor which is $(1-0.27) = .73$ times more protective. This means patient people who change catheters as often as have been directed have .73 times more protection from pressure ulcer.

In table 4.2.5, the data reveals that among 80 participants, in case group 61% people have episodes of bladder incontinence and 38.5% people did not have episodes of bladder incontinence. In control group 39% people have episodes of bladder incontinence and 61.5% people did not have episodes of bladder incontinence. At 95% level of significance chi- square value was 1.96. The observed value was $X^2=4.053$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p=0.044$). That means patients have episodes of bladder incontinence have higher chances of pressure ulcer.

Here in 95% CI ranging from 1.02 (LL) to 6.15 (UL), the odd ratio was 2.5 which is greater than 1. This means it is a risk factor. This indicates that the participants who have episodes of bladder incontinence had 2.5 times more likely risk of developing pressure ulcer.

In table 4.2.5, the data reveals that among 80 participants, in case group 15% people use a rectal suppository as part of my regular bowel program and 61.7% people did not use a rectal suppository as part of my regular bowel program. In control group 85%

people use a rectal suppository as part of my regular bowel program and 38.3% people did not use a rectal suppository as part of my regular bowel program.

At 95% level of significance chi- square value was 1.96. The observed value was $X^2=13.067$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p= 0.000$). That means patients who do not use a rectal suppository as part of my regular bowel program have higher chances of pressure ulcer.

Here at 95% of CI= 0.029-0.416, the OR= 0.11 which is less than 1, that means it is a protective factor which is $(1-0.11) = .89$ times more protective. This means patient people who use a rectal suppository as part of my regular bowel program have .73 times more protection from pressure ulcer.

4.3 Case-control group and association with gender

Table 4.3 Association of gender and case-control group

Exposure	Case (%)	Control (%)	Chi square	P values	Odds ratio	95%of CI	
						L/L	U/L
Gender			5.495	0.019	3.116	1.184	8.200
Male	59.6%	40.4%					
Female	32.1%	67.9%					

In table 4.3, the data reveals that among 80 participants, in case group 15% were male and 32% were female. In control group 40% people were male and 68% were female.

At 95% level of significance chi- square value was 1.96. The observed value was $X^2=5.495$ which is greater than table value. That means null hypothesis was rejected and alternative hypothesis was accepted. This result is statistically significant ($p= 0.019$). That means patients males higher chances of developing pressure ulcer.

Here in 95% CI ranging from 1.184 (LL) to 8.2 (UL), the odd ratio was 3.116 which is greater than 1. This means it is a risk factor. This indicates that the participants who are males had 3.116 times more likely risk of developing pressure ulcer.

4.4 Case-control group and association with occupation

Table 4.4 Association of occupation and case-control group

Exposure	Case (%)	Control (%)	Chi square	P values	Odds ratio	95% of CI	
						L/L	U/L
Occupation			0.240	0.624	0.818	0.367	1.826
Job	57.7%	42.3%					
No job	62.5%	37.5%					

In table 4.4, the data reveals that among 80 participants, in case group 57.7% people had job and 62.5% people did not have job. In control group 42.3% people had job and 37.5% people had no job. The percentage of pressure ulcer was not differed by occupation, $X^2(1, N=80) = 0.24, p= 0.624$. The result is not statistically significant and failed to reject null hypothesis. This indicates that there is no enough evidence that occupation contribute in pressure ulcer development.

4.5 Case-control group and association with educational level

Table 4.5 Association of educational level and case-control group

Exposure	Case (%)	Control (%)	Chi square	P values
Educational level				
Illiterate	63.6%	36.4%	0.198	0.906
Non-graduates	58.5%	41.5%		
Graduates	61.5%	38.5%		

In table 4.5, the data reveals that among 80 participants, in case group 63.6%, 58.5% and 61.5% were illiterate, non- graduates and graduates respectively. In control group 36.4%, 41.5% and 38.5% were illiterate, non- graduates and graduates respectively. The percentage of pressure ulcer was not differed by educational level, $X^2(1, N=80) = 0.198, p= 0.906$. The result is not statistically significant and failed to reject null

hypothesis. This indicates that there is not enough evidence that educational level of patient contributes in pressure ulcer development.

Lifestyle changes are most likely to happen after SCI and it influences the health behavior of the person. Everybody encounters changes throughout their life. Change is the manner by which you adjust to, or become used to those new circumstances. Spinal cord injury (SCI) is without uncertainty another testing circumstances. SCI influences pretty much every part of life when it occurs. This study shows that lifestyle of the person living in the community is considerably influenced by health behavior of the person. This health behavior is influenced by several factors they incorporate in their life. The study purpose was to find out the lifestyle factors affecting in the development of the pressure ulcer following spinal cord injury in community living patients. Findings of this study suggest there are several lifestyle factors that influence in development of pressure ulcer in community residing patients.

5.1 Socio-demographics

Socio demographic findings of this study showed that majority of the participants were between the age group 18-27 years of age with $n= 20$ (25%) and similarly other study the least in 28-37 years 15 (19%) and very few in 58-76 years in this study In this study, majority of the respondents were male 65% and females 35%. This study is similar with the other findings, where the majority of participants were between age 20-29 and majority being males (WHO, 2013). The study done in Bangladesh shows the similar findings that the majority of spinal cord injured were males between age group 20-29 (Rahaman, Ahmed, Sultana, Taoheed, Andallb & Arafat, 2017).

This study suggests that males had 3.12 time likely to have pressure ulcer than females (OR= 3.12; 95% of CI 1.18- 8.2). Similarly, authors Brandeis, Ooi, Hossain, Morris & Lipsitz (1994) have found that males are in higher risk for pressure ulcer development (OR= 1.9; 95% of CI 1.2- 3.6). While another study done in community of UK suggests that there is no association of gender in development of pressure sore (Raghavan, Raza, Ahmed & Chamberlain; 2003).

As regards to the marital status of respondents, majority of the participants were married 23 (28.7%) and very least was widow. Most of the participants were living in the rural area (35%) and least were living in urban area 13 (16.3%) and very few in semi-urban area. This study is consistent with the other studies in Bangladesh done by

Hoque et al., 1994 & Rahaman et al, 2017 where majority of patients were married and from rural area.

Most of the participants religion was Islam (96.3%) and very few were Hindu (3.7%). This is consistent with the religion aspects in Bangladesh. Majority of the participants 29 (36.3%) had spinal cord injury from 0-10 years and least was observed for 3 (3.8%) participants with spinal cord injury for 31-40 years.

Participants in both groups had sustained traumatic spinal cord injury. Most of the participants 34 (42.5%) had injury level at T₁₀-T₁₂ and least participants were 8 (10%) at T₂-T₅ level, 15 (18.8%) participants sustained injury at L₁-L₄. This is consistent with the study conducted in Bangladesh where T₁₁- L₂ was commonly involved (Razzak, Roy & khan; 2016).

This study shows that most of the participants n= 22 (27.5%) had completed primary level education, and few were illiterate n= 17 (21.3%) and very few n= 2 (2.5%) have completed master's education. This study suggests no association of level of education with pressure ulcer development ($X^2 = 0.198$, $p = 0.906$). This is not consistent with study ($p=0.03$) at the time of the survey (Saunders, Krause, Peters, & Reed; 2010).

Majority of the participants 31.3% had no job at the time of survey, followed by 25.1% were daily laborer and least participants were 5.1% farmers. This study is consistent with study done by Quadir et al., 2017 where majority of the participants were with no job (57%). This study shows that there is no association of occupation with pressure ulcer development in spinal cord injury patients (OR= 0.818; 95% of CI 0.37- 1.83; $p = 0.62$). This is consistent with the study done in south Africa ($X^2 = 0.584$, $p = 0.892$) that there is no association of occupation and pressure ulcer development (Mathew, Samuelkamaleshkumar, Radhika & Elango; 2013).

5.2 Lifestyle factors

This study intended to analyze the different lifestyle factors of community living SCI patients which lead to pressure ulcer development. Thus, 5 (five) lifestyle factors were analyzed: 1) Cardiovascular 2) Neuromusculoskeletal 3) Skin factors 4) Psychological factors 5) Genitourinary.

5.2.1 Cardiovascular factors

This study shows that in cardiovascular factors avoiding smoking (OR=0.74, CI= 0.065-0.464) which is a protective factor as odd ratio is less than one. So, the patient who have avoided smoking were less likely to develop pressure ulcer. Author Lane et al., 2016 found that smokers presented with a greater number of pressure injuries than nonsmokers, as smoking interferes with the wound healing.

5.2.2 Neuromusculoskeletal factors

This study shows that in neuromusculoskeletal factors performing range of motion exercise daily to keep joint flexible is protective factor from pressure ulcer development (OR= 0.086; CI= 0.028-0.267) as odd ratio is less than 1. Similarly, exercising to enhance muscle strength is also associated as protective factor from pressure ulcer development (OR= 0.074; CI= 0.22-0.249) as odd ratio is less than 1. Likewise, performing activities to put weight on the bones to help increase bone density is also protective factor from in pressure ulcer development (OR= 0.044; CI= 0.03-0.27) as odd ratio is less than 1. A study found that inadequate exercise decreases the cardiovascular, muscular and metabolic health; and promote secondary complications in spinal cord injured patients. Inadequate exercise can in long term influence the development of secondary complications like pressure sore in spinal cord injured patients (Evans, wingo, sasso, gorgey & harness, 2015). However, direct association of not performing exercise with pressure ulcer development is not reported.

This study shows that in neuromusculoskeletal factors, patients who are visiting therapist at least once a year for monitoring their exercise predicted as protective factor (OR=0.098, CI= 0.02-0.447) from pressure ulcer development as odd ratio is less than 1. Guiham, Hastings & Garber; 2019 also emphasized the positive role of the therapist in the prevention and treatment of pressure ulcer in the spinal cord injured patients. However, not visiting therapist at least once a year for exercise monitoring and pressure ulcer development is not reported.

This study shows that participants that pay attention to position the body in a wheelchair is found to be protective factor (OR= 0.365, CI= 0.264-0.506) from developing pressure ulcer as odd ratio is less than 1. This study supports the study where it is found that patient who were self-repositioning during prolonged sitting in wheelchair as protective factor from pressure ulcer development (Stockton & Parker; 2002). While Groah,

Schladen, Pineda, & Hsieh (2015) argued that flexible seated positioning and pressure relief maneuver along with patient education is helpful in pressure ulcer prevention.

Similarly, paying attention to position the body while sleeping is predicted as a protective factor (OR=0.01, CI= 0.02-0.45) as odd ratio is less than 1. So, patients paying attention to position the body were protective from developing the pressure ulcer. This study supports the systematic study performed by Krapfl & Gray, 2008 and Gillespie, Chaboyer et al., 2014 where frequent re-positioning the body in bed and while sleeping is associated with the prevention of pressure ulcer development.

This study shows that participants that know what do when there is beginning of contracture are likely to develop pressure ulcer and predicted as protective factor (OR= 0.15, CI= 0.06-0.41) from developing pressure ulcer as odd ratio is less than 1. A study found that incidence of contracture in SCI patients are most common and is risk factor for pressure ulcer development (Diong et al., 2012). Author Dalyan, Sherman & Cardenas in 1998 has found that pressure ulcer was significantly more likely with a contracture than patients without a pressure ulcer (p=0.05).

5.2.3 Skin Factors

This study shows that participants that do check their skin for redness or breakdown have protective factor (OR= 0.365, CI= 0.26-0.51) from developing pressure ulcer as odd ratio is less than 1. So, patients checking their skin for redness or breakdown are at low risk and less likely to develop pressure ulcer. Sheppard & Kennedy in 2006 found similar results where pressure ulcer development and not checking skin were associated; they said knowledge of skin care was negatively correlated with occurrence of pressure sore (r= -.38, p< .01).

This study shows that participants that perform pressure relief every 30 minutes is a protective factor (OR= 0.073, CI= 0.019-0.277) from developing pressure ulcer as odd ratio is less than 1. Similar was reported by Morita, Yamada, Wantanbe & Nagahori; 2015, who found that no pressure ulcer group have performed better in pressure relief maneuver than pressure ulcer group. Like previous studies, it is recommended to perform pressure relief maneuver and should be part of patient education (Yang, Chang, Hsu & Chang; 2009).

This study showed that the patients who are careful while doing transfers is a protective factor (OR= 0.038, CI= 0.05-0.309) from developing pressure ulcer as odd ratio is less than 1. So, patients careful doing transfers have protective factor from developing pressure ulcer. Amatachya, Wannapakhe, Arrayawichanon, Sriritarathiwat & Wattanapun in 2011 said that complete paraplegic patients reported frequent falls and at least one complication (including) post discharge from rehabilitation. Further research is required for determining transfer falls and pressure ulcer development.

This study showed that the patients who were wearing something when out of bed are protective (OR= 0.043, CI= 0.009-0.203) from developing pressure ulcer as odd ratio is less than 1. So, wearing something when out of bed has protective factor development of pressure ulcer. A study was found that in decubitus ulcer patient where the ulcer in the feet was due to unrelieved pressure on the diabetic foot (Wagers., & Panchang; 2011), Further research is required on it and patient education on wearing pressure relieving foot wares should be given.

This study showed that the patients who were aware of the condition of wheelchair predicted to be protective factor (OR= 0.06, CI= 0.007-0.487) from developing pressure ulcer as odd ratio is less than 1. Author Morita et a., 2015 study findings in no pressure ulcer group suggested that the patients in the no pressure ulcer group ($p=0.007$) were concerned about their cushions and updated them regularly than pressure ulcer group. This result suggests that it is very crucial for patients to know about cushions, be updated and change the cushions.

5.2.4 Psychological Factors

This study showed that the patient who had accessible house is predicted as protective factor (OR= 0.091, CI= 0.027-0.304) as odd ratio is less than 1. The study revealed that patients who were able to get around the house were less likely to develop pressure ulcer. Rathore, Mansoor in 2013 emphasized that majority of the SCI patients in developing countries are confined to home due to various reasons and are vulnerable to pressure ulcer. The study conducted by Ahmad, Shakil-ur-Rehman & Sibtain in 2013 found that home modification has better outcome in improving quality of life in patients. However, it is unclear how inaccessible house can contribute in pressure ulcer development. In this study most of the participants were from rural area and most of them have no job so it may contribute to inaccessible house and sedentary lifestyle

which in turn may contribute to pressure ulcer development in pressure ulcer group; so further research is required

5.2.5 Genitourinary Factors

In this study 70% SCI patients in pressure ulcer group did not change intermittent catheter as directed while 30% further did not change intermittent catheter in no pressure ulcer group. There was association between not using intermittent catheter as directed and pressure ulcer development ($p=0.039$). Since, odd ratio is less than 1, using intermittent catheter as directed is a protective factor from pressure ulcer development (OR= 0.328, CI= 0.111-0.969). Similarly, in this study 73.7% participants in pressure ulcer group did not change catheters as have been directed, while 26.3% in no pressure group did not change. There was association of not changing catheter as directed ($p=0.018$). Since odd ratio is less than 1, changing catheter as directed is a protective factor (OR= 0.265, CI= 0.085-0.83). Shen, Zheng, Zhang, Zeng & Hou in 2012 noted that intermittent catheter as a most appropriate method of bladder voiding and if clean catheter is used in a recommended schedule can prevent urological complications (Weld & Dmochowski; 2000). Having a UTI was associated with an increased risk (OR: 2.86) in pressure ulcer development (Joseph & Wikmar; 2016). Since this study did not explore the UTI prevalence among the study subjects, further study should also focus on risk of pressure ulcer development in patients not using intermittent catheter as direct and sticking to schedule and prevalence of urinary tract infection also.

This study showed that the patients who were having episodes of bladder incontinence are likely to develop pressure ulcer. The association was significant ($p=0.044$). It had a relation, and predicted a risk (OR= 2.5, CI= 1.016-61.49) of developing pressure ulcer. The result was similar with the findings of author Wilczwesi, Grimm, Giannis, Gill, Sarver & McNett in 2012 ($X^2=9.518$, $p=0.009$) with incontinence of urine significantly associated with pressure ulcer development. Sumiya, Kawamura, Tokuhiko, Takechi & Ogata in 1997 reported that urinary incontinence is the risk factor increasing the development of pressure sore. This study supports findings in this study. While Berlowitz & Wilking in 1989 in a cross-sectional study were unable to find the association of incontinence of urine and pressure ulcer development

The study showed that the patients who were using rectal suppository as part of bowel predicted as protective factor (OR=0,11, CI 0.029–0.416) from developing a pressure

ulcer, as odd ratio is less than 1. Wilczwesi, Grimm, Giannis, Gill, Sarver & McNett in 2012 highlighted the fecal management system and its risk and association ($X^2= 7.973$, $p=0.047$) in development of pressure sore. Brandeis, Ooi, Hossain, Morris and Lipsitz in 1994 conducted a longitudinal study which identified the association ($p= 0.04$) and risk (OR= 2.5, CI 1.6- 4) of fecal incontinence in pressure ulcer development.

LIMITATIONS

- The sample size was small. The numbers of case and control group were in different districts of Bangladesh. So, the outreaching of the patients limited the study to 1:1 ratio of data collection, not being able to reach 1:3 ratio.
- Most of the sample in the case group were found to be dead due to the various complication where pressure ulcer being the major cause.
- Since most of the sample were residing in the rural areas of Bangladesh accessibility to reach the patient house was very difficult.
- Selection bias might have introduced while selecting the patients as it was only conducted based on the CRP database and outreaching them with that data.
- Performance bias from respondents' side might have introduced during data collection as respondents might be aware of what is to be asked to them. They might have subconsciously changed their choice to make themselves in better view and options of researcher. Key informant might have wished to keep quiet about actual status about their daily lifestyles.
- Changing the Likert scale of 5-point into the 2 point for the calculation might have led to different results as we were unable to draw conclusion with 5-point where many cells were found to be empty during analysis.
- The study might have missed other possible factors like economic status, accessibility of the house, nutrition, caregiver support which might have possibly affected in development of pressure sore.

CHAPTER VII CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion:

After the completion of this study, investigators were able to know the major lifestyle factors causing pressure ulcer in spinal cord injured population living in the community of Bangladesh. This study revealed that being male and having urinary incontinence are risk factors for development of pressure ulcer. The lifestyle factors like avoiding smoking, performing regular exercises, attentive for body position in wheelchair and while sleeping, knowing about what to do at beginning of contracture, checking skin for damage or redness, performing pressure reliefs, careful during transfers, protecting foot when out of bed, knowing about wheelchair cushion condition, accessible house, changing catheter as directed, using suppository for rectal management were found to be protective factors from pressure ulcer development in community residing spinal cord injured patients.

7.2 Recommendations

In this study, only 80 participants were selected as a sample, so further research can be done with larger sample size for validity and reliability of results. The study was confined mostly with the patients discharged from CRP, Bangladesh, other institutions sample can also be taken for covering wider range of spinal cord injured populations. Further research could be explored by direct means of risk of lifestyle factors and pressure ulcer development through Cohort study. Further study could be done on inaccessible house and development of pressure ulcer in community SCI patients. Further research could be done on heel pressure on not using foot ware and risk of pressure ulcer development for wheelchair using paraplegics. Further study could be done on transfer fails and pressure ulcer development and determine the association with caregivers.

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APPENDIX

Appendix I

Informed consent in English

CONSENT FORM

(Please read out to the participants)

Assalamualaikum/Namasker, my name is Dronacharya Gyawali, I am conducting this study for M.Sc. in Rehabilitation Science project study dissertation titled **“Susceptibility of pressure ulcers development of patients with SCI in accordance with lifestyle at community in Bangladesh”** 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. You will perform some tasks which are mention in this form. 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.

Do you have any questions before I start?

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

Yes

No

(Thumb print for illiterate participant)

Signature of the Participant _____

Signature of the Interviewer _____

Right	Left

Appendix II

Informed consent in Bangla

সম্মতি পত্র

(অংশগ্রহনকারীকে পড়ে শোনাতে হবে)

আসসালামুআলাইকুম/নমস্কার,

আমার নাম দ্রুনাছারা গ্যাংলি, আমি এই গবেষণা প্রকল্পটি বাংলাদেশ হেল্ প্রফেশনস ইনস্টিটিউট (বিএইচপিআই)-এ পরিচালনা করছি আমার এম সি ইন রিহাবিলিটেশন সায়েন্স কোর্সের অধিভুক্ত। আমার গবেষণার শিরোনাম হল-

“সুসচেতনবিলিত্য প্রেসসুরে উল্চেরস ডেভেলপমেন্ট অফ পেশেন্ট উইথ এসিআই ইন অক্সোর্ডাংস উইথ লাইফস্টাইল এট কমিউনিটি ইন বাংলাদেশ”। আমি এশ্বরে আপনাকে কিছু ব্যক্তিগত এবং আনুষঙ্গিকপূর্ণমেব্বরজ্জ ক্ষতিগ্রস্থ সম্পর্কে করতে চাচ্ছি। এতে আনুমানিক ৩০ মিনিট সময় নিবো।

আমি আপনাকে অনুগত করছি যে, এটা আমার অধ্যয়নের অংশ এবং যা অন্যকোন উদ্দেশ্যে ব্যবহৃত হবে না। গবেষক সরাসরি এই স্নায়ুজ্ঞান অধ্যয়নের সাথে অন্তর্ভুক্ত নয়। তাইএই গবেষণায় আপনার অংশগ্রহণ বর্তমান ও ভবিষ্যৎ চিকিৎসায় কোন প্রকার প্রভাব ফেলবেনা। আপনি যে সব তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং আপনার প্রতিবেদনের ঘটনা প্রবাহে এটা নিশ্চিত করা হবে যে এই তথ্যের উৎস অপ্রকাশিত থাকবে।

এই অধ্যয়নে আপনার অংশগ্রহণে স্বেচ্ছাপ্রণোদিত এবং আপনি যে কোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক ফলাফল ছাড়াই নিজেকে প্রত্যাহার করতে পারবেন। এছাড়াও কোন নির্দিষ্ট প্রশ্ন অপছন্দ হলে উত্তর না দেয়ার এবং সাক্ষাৎকারের সময় কোন উত্তর না দিতে চাওয়ার অধিকারও আপনার আছে।

সাক্ষাৎকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে যাচ্ছি।

হ্যাঁ.....

না.....

(নিরীক্ষার অংশগ্রহণ কারীদের আঙ্গুল ছাপ)

১। অংশগ্রহনকারীর স্বাক্ষর.....

২। সাক্ষাৎগ্রহনকারীর স্বাক্ষর.....

ডান	বাম

Appendix III

Questionnaire in English and Bangla

QUESTIONNAIRE (প্রশ্নাবলী)

**Topic (বিষয়): Susceptibility of pressure ulcers development of patients with SCI
in accordance with lifestyle at community in Bangladesh**

ID No. (আইডি নাম্বার):

১. Personal Details (ব্যক্তিগত বিবরণ):

১.১ Name (নাম):

১.২ Present Address (বর্তমান ঠিকানা):

১.৩ Permanent Address (স্থায়ী ঠিকানা):

১.৪ Contact number (যোগাযোগের নম্বর):

২. Socio-demographic Factors (সামাজিক- জনতাত্ত্বিক ফ্যাকটর):

২.১ Age (বয়স):

২.২ Gender (লিঙ্গ): Male (পুরুষ) Female (মহিলা)

২.৩ Occupation (পেশা):

- ১) Farmer (কৃষক) ২) Daily laborer (দৈনিক শ্রমিক)
৩) Service holder (চাকুরীজীবী) ৪) Others (অন্যদের):

২.৪ Marital status (বৈবাহিক অবস্থা):

- ১) Unmarried (অবিবাহিত) ২) Married (বিবাহিত)
৩) Divorced (তালাকপ্রাপ্ত) ৪) Widow (বিধবা)

২.৫ Duration of injury (আঘাতের সময়কাল):

২.৬ Duration of pressure sore development (চাপ জনীত ঘা হওয়ার সময়কাল):

২.৭ Level of injury (আঘাত স্তরের):

২.৮ Education Status (শিক্ষাগত যোগ্যতা):

- ১) Illiterate (নিরক্ষর) ২) Primary (প্রাথমিক) ৩) Secondary (মাধ্যমিক)
৪) SSC (এসএসসি) ৫) HSC (এইচএসসি) ৬) Bachelors (স্নাতক)
৭) Masters and above (স্নাতকোত্তর এবং উপরে)

২.৯ Family Size (পরিবারের আকার):

- ১) Small (ছোট) ২) Large (বড়)

২.১০ Family Number (পারিবারিক সংখ্যা):

- ১) 2-3 ২) 4-5 ৩) 5 and above

২.১১ Living area (বসবাসের এলাকা)

- ১) Urban (শহর) ২) Semi-Urban (মফস্বল) ৩) Rural (গ্রামীণ)

২.১২ Religion (ধর্ম)

- ১) Islam (ইসলাম) ২) Hindu (হিন্দু) ৩) Buddhist (বৌদ্ধ) ৪) Others (অন্যরা)

৩. Spinal Cord Injury Lifestyle Scale (স্পাইনাল কর্ড ইনজুরি জীবনযাত্রার মান)

Code (সংকেতপদ্ধতি) :

<p>Rating System (মাণ নির্ধারণ):</p> <p>৪ = almost always (প্রায় সবসময়)</p> <p>৩ = frequently (ঘনঘন)</p> <p>২ = sometimes (মাঝেমাঝে)</p> <p>১ = rarely (কদাচিৎ)</p> <p>০ = never (কখনও না)</p>	<p>Rating System for Reverse scoring: (#3 in genitourinary category) (বিপরীত স্কোরিং এর জন্য মাণ নির্ধারণ: (#৩ জনন - মূত্রাশয় বিভাগে))</p> <p>০ = almost always (প্রায় সবসময়)</p> <p>১ = frequently (ঘনঘন)</p> <p>২ = sometimes (মাঝেমাঝে)</p>
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One item (genitourinary #3) is reverse scored (একটি পদ বিপরীত স্কোরিং (#৩ জনন – মূত্রাশয় ভাগে))

Item (পদ)	০ Never (কখনও না)	১ Rarely (কদাচিৎ)	২ Someti mes (মাঝেমাঝে)	৩ Freque ntly (ঘনঘন)	৪ Almost always (প্রায় সবসময়)
৩.১ Cardiovascular Factors: (হৃদ-রক্তসংবহনতান্ত্রিক বিষয়ক কারন সমূহ):					
৩.১.১. I avoid smoking cigarettes. (আমি ধূমপান এড়িয়ে চলি)					
৩.১.২. I limit the amount of fat and cholesterol in my diet (for example, I limit red meats, dairy products). (আমি আমার খাদ্য তালিকায় চর্বি এবং কলেস্টেরল পরিমাণ কমিয়ে চলি (উদাহরণস্বরূপ, আমি গরুর মাংস, দুগ্ধজাতীয় খাবার কম খাই))					
৩.১.৩. I am aware of and try to reduce my risk for heart disease. (আমি সচেতন এবং হৃদরোগের ঝুঁকি কমাতে চেষ্টা করছি)					

<p>৩.১.৪. I monitor my blood pressure on a regular basis. (আমি নিয়মিত আমার রক্তচাপ পর্যবেক্ষণ করি)</p>					
	<p>০ Never (কখনও না)</p>	<p>১ Rarely (কদাচিৎ)</p>	<p>২ Sometimes (মারোমারো)</p>	<p>৩ Frequently (ঘনঘন)</p>	<p>৪ Almost always (প্রায় সবসময়)</p>
<p>৩.২ Neuromusculoskeletal Factors: (নিউরোমাস্কুলোস্কেলেটাল বিষয়ক কারন সমূহ):</p>					
<p>৩.২.১. I do range of motion exercises daily to keep my joints flexible. (আমি প্রতিদিন রেঞ্জ অফ মোশন এক্সারসাইজ করি আমার অস্থি-জোড়া সমূহকে নমনীয় রাখতো)</p>					
<p>৩.২.২. I do exercises that enhance my muscle strength (for example, weight training) at least 3 times a week. (আমি এমন ব্যায়াম করি যা আমার মাংসপেশীকে শক্তিশালী করে(উদাহরণস্বরূপ, ভারোত্তলন প্রশিক্ষণ) সপ্তাহে কমপক্ষে ৩ বার)</p>					
<p>৩.২.৩. My muscle strengthening exercises are monitored by a therapist at least once a year. (আমার মাংসপেশী শক্তিশালীকরণ ব্যায়াম করতে বছরে কমপক্ষে একবার একজন থেরাপিস্ট দ্বারা পর্যবেক্ষণ করি)</p>					
<p>৩.২.৪. I allow my shoulder joints to rest when I am having pain from overusing them. (আমি আমার কাঁধের অস্থিজোড়া কে বিশ্রাম দেই যখন আমি অস্থিজোড়ার অতিরিক্ত ব্যবহারে ব্যথা অনুভব করি)</p>					

<p>৩.২.৫. I do activities which put weight on the bones in my legs to help increase bone density about 3 times a week (for example, use standing frame).</p> <p>(আমি সপ্তাহে অন্তত ৩ বার এমন কাজ করি যা আমার পায়ের অস্থির ঘনত্ব বাড়াতে সাহায্য করে (উদাহরণস্বরূপ, স্ট্যান্ডিং ফ্রেম ব্যবহার করা))।</p>					
<p>৩.২.৬. I pay attention to the position my body is in when I am in my wheelchair.</p> <p>(আমি হুইলচেয়ারে থাকা অবস্থায় আমার শরীরের অঙ্গভঙ্গির অবস্থান এর দিকে মনোযোগ দিই)</p>					
<p>৩.২.৭. I pay attention to the position my body is in when I am sleeping.</p> <p>(আমি ঘুমানোর আগের সময় আমার শরীরের অঙ্গভঙ্গির অবস্থার দিকে মনোযোগ দিই)</p>					
<p>৩.২.৮. If I noticed the beginning of a contracture (a joint that is `freezing up'), I would know exactly what to do.</p> <p>(যদি আমি মাংসপেশীর টান অনুভব করি (কোন জয়েন্ট ‘শক্ত হয়ে যাওয়া’), আমি জানি কি করতে হবে)</p>					
	০ Never (কখনও না)	১ Rarely (কদাচিৎ)	২ Someti mes (মঝেমঝে)	৩ Freque ntly (ঘনঘন)	৪ Almost always (প্রায় সবসময়)
<p>৩.৩. Skin Factors (ত্বক বিষয়ক কারন সমূহ) :</p>					
<p>৩.৩.১. I check my skin to look for any areas of redness or breakdown.</p> <p>(আমি আমার ত্বক পরীক্ষা করি যে কোথাও ত্বক লাল অথবা ভাঁজ হয়েছে কিনা।)</p>					

<p>৩.৩.২. I do some type of pressure relief every 30 minutes any time I am in my chair or driving. (আমি চেয়ারে থাকা বা ড্রাইভিং এর সময় সময় প্রতি ৩০ মিনিট পর পর চাপ কমানোর জন্য কিছু করি)</p>					
<p>৩.৩.৩. I am careful not to bump my legs, feet, or buttocks when doing transfers. (আমি ট্রান্সফার করার সময় আমার পায়ে, পায়ের পাতা বা পায়ের আঙ্গুলগুলোকে আঘাত পাওয়া থেকে বাঁচানোর ব্যাপারে সতর্ক থাকি)</p>					
<p>৩.৩.৪. I wear something on my feet when I am out of bed (for example, shoes or foam boots). (আমি বিছানার বাইরে থাকাকালীন সময়ে পায়ে কিছু পরিধান করি (উদাহরণ স্বরূপ জুতা অথবা ফোম বুট))</p>					
<p>৩.৩.৫. I am careful when handling hot liquids by not carrying them in my lap. (আমি গরম তরল বস্তু ব্যবহারের সময় কোলে বহন না করার ব্যাপারে সতর্ক থাকি)</p>					
<p>৩.৩.৬. I am aware of the condition of my wheelchair cushion. (আমি আমার হুইল চেয়ারের গদির ব্যাপারে সতর্ক থাকি)</p>					
<p>৩.৩.৭. I am aware of the condition and repair needs of my wheelchair. (আমি আমার হুইল চেয়ারের অবস্থা এবং মেরামতের ব্যাপারে সতর্ক থাকি)</p>					
	০ Never (কখনও না)	১ Rarely (কদাচিৎ)	২ Sometimes (মাঝেমাঝে)	৩ Frequently (ঘনঘন)	৪ Almost always (প্রায় সবসময়)
<p>৩.৪. Psychosocial Factors (মনোসামাজিক বিষয়ক কারন সমূহ):</p>					
<p>৩.৪.১. I am able to get around in my house (my house is wheelchair accessible).</p>					

(আমি আমার বাড়ির চারিদিকেই যেতে সক্ষম (আমার বাড়ি হুইলচেয়ার প্রবেশগম্য))					
৩.৪.২. I am with or talk to other people at least once a day. (আমি দিনে অন্তত একবার অন্যদের সঙ্গে থাকি বা কথা বলি)					

Rating System for Reverse Scoring: (#3 in genitourinary category)

(বিপরীত স্কেরিং এর জন্য মাপ নির্ধারণ: (#৩ জনন – মূত্রাশয় বিষয়ক বিভাগ))

০ = Almost always (প্রায় সবসময়)

১ = frequently (ঘনঘন)

২ = Sometimes মাঝেমাঝে

৩ = rarely (কদাচিৎ)

৪ = never (কখনও না)

	০ Almo st alway s (প্রায় সবসময়)	১ Frequ ently (ঘনঘন)	২ Some times (মাঝেমা ঝে)	৩ Rarely (কদাচিৎ)	৪ Never (কখনও না)
৩.৫. Genitourinary Factors (জনন – মূত্রাশয় বিষয়ক কারন সমূহ):					
৩.৫.১ I use an intermittent catheterization program and stick to the recommended schedule. (আমি একটি ইন্টারমিটেন্ট (খোলা বা লাগানো যায়) ক্যাথেটার প্রোগ্রাম ব্যবহার করি এবং প্রস্তাবিত সময়সূচী মেনে চলি)					
৩.৫.২. I change my catheters as often as I have been directed to. (আমি আমার ক্যাথেটার গুলো যত বার আমাকে পরিবর্তন করতে বলা হয়েছে ততবারই পরিবর্তন করেছি।)					

<p>৩.৫.৩. I have episodes of bladder incontinence. *(item is reverse-scored) (আমার পেশাবের উপর নিয়ন্ত্রন কমা *(আইটেমটি বিপরীত- স্কোর))</p>					
<p>৩.৫. I use a rectal suppository as part of my regular bowel program. (আমি নিয়মিত রেকটাল সাপোজিটরি ব্যবহার করি আমার পায়খানা করার অংশ হিসাবে একটি।)</p>					

Appendix IV

Approval of thesis



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

Ref.

CRP-BHPI/IRB/09/18/1226

Date: 17/07/18

To,
Dronacharya Gyawali
M.Sc. in Rehabilitation Science (MRS)
Session: 2017-2018, Student ID 181170089
BHPI, CRP-Savar, Dhaka-1343, Bangladesh

Subject: Approval of thesis proposal "Susceptibility of pressure ulcers development of patients with SCI in accordance with lifestyle at community in Bangladesh" by ethics committee.

Dear Dronacharya Gyawali,

Congratulations,

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

S.N.	Name of Documents
1.	Thesis Proposal
2.	Questionnaire (English and Bangla version)
3.	Information sheet & consent form.

Since the study involves use of a **Spinal Cord injury Lifestyle Scale (SCILS)** which measures different factors to identify the association of different factors with pressure sore development in spinal cord injury patients in the community which may take about 30 minutes to collect data and there is no likelihood of any harm to the participants, the members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 10 AM on 22/04/2018 at BHPI.

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

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ, ফোন : ৭৭৪৫৬৪-৫, ৭৭৪১৪০৪ ফ্যাক্স : ৭৭৪৫০৬৯

CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404, Fax : 7745069, E-mail : contact@crp-bangladesh.org, www.crp-bangladesh.org

Appendix V

Permission for data collection

Date: 17/09/2018

To,

The Head of Rehabilitation Wing and Spinal Cord injury physiotherapy Department

Centre for the Rehabilitation on Paralysed (CRP)

Savar, Dhaka-1343, Bangladesh

Subject: Application for permission to collect data.

Respected Sir,

After per my thesis study, titled, "Susceptibility of pressure ulcers development of patients with SCI in accordance with lifestyle at community in Bangladesh", under the honorable supervisor, **Mohammad Anwar Hossain**, Associate professor and Head of department of CRP, Dhaka, Bangladesh. The purpose of the study is to determine the associations between selected daily living lifestyles factors and pressure ulcer development in adults with spinal cord injury, CRP, Bangladesh.

The study involves use of a **Spinal Cord injury Lifestyle Scale (SCILS)** that measure different factors like musculoskeletal factors, cardiovascular factors, skin factors, Genitourinary factors, and psychosocial factors and to identify the association of different factors with pressure sore development. That may take 30 minutes to fill in the questionnaire. There is no likelihood of any harm to the participants and / or participation in the study and may benefit the participants or other stakeholders as the proposed study will help to identify possible lifestyle factors for the development of pressure sore in spinal cord injury patients in community. Related information will be collected from the patient's guide books. Data collectors will receive informed consent from all participants. Any data collected will be kept confidential.

Sincerely,

Dronacharya Gyawali
Dronacharya Gyawali
Part-II MRS 4th Batch
Student of M.Sc. in Rehabilitation Science (MRS)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Recommendation from the Head of Physiotherapy Department:

Mohammad Anwar Hossain
Mohammad Anwar Hossain
Associate professor and Head of department of CRP, Dhaka, Bangladesh

Allow to data
Collection at SCI
Unit.
M.Hossain
19/9/18

Forwarded to
Sr. Counselor + in-charge - SWD
Siddhanta
19/9/18

Approved
Please contact with
Ms. Mozaffar Hossain.
re: SCI kindly
help with regards
Mozaffar Hossain

Mozaffar Hossain
Mohammad Mozaffar Hossain
Associate Professor
Physiotherapy Dept.
CRP-Chapain, Savar, Dh.