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Disability and Pain Grades of Lower Crossed Syndrome in Young Adults

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Abstract Study Design: Cross-Sectional Study. Objective: To study the disability and pain grades of the lower crossed syndrome in young adults. Background: Lower Crossed Syndrome also known as the distal crossed syndrome is due to an imbalance in the strength of muscles in the lower region. A specific sequence of tight hip flexors & lumbar extensors in combination with weakness of deep abdominal muscles & gluteus maximus leads to this condition which in turn can progressively lead to disability and severe pain. Hence, this study aims to find out the disability and pain grades of the lower crossed syndrome in young adults. Methods: In this study 30 male and female patients between the ages of 21 and 31 years were diagnosed with Lower crossed Syndrome with MMT, Goniometer, and Flexi curve. Patients were asked to fill out the Oswestry disability index questionnaire to measure the disability grade and pain intensity via the NPRS questionnaire. Conclusion: The majority of the population was found to be moderate and severely affected by LCS in terms of disability according to Oswestry Disability Index and the Maximum part of the population had severe pain intensity according to the Numeric pain rating scale.

Keywords Lower Crossed Syndrome, LCS Disability Score, Distal Crossed Syndrome, Lower Crossed Syndrome Disability

1. Introduction

Lower crossed syndrome (LCS) is also recognized as a distal crossed syndrome or pelvic crossed syndrome. Imbalance in the strength of muscles in the lower region leads to LCS [1,2]. This condition can be described as a specific sequence of tight hip flexors & lumbar extensors in combination with weakness of deep abdominal muscles & gluteus maximus muscle leading to an 'S-shaped posture of lower back [1,3]. This combination of muscle imbalance forms a joint dysfunction, particularly at the level of L4-L5 & L5-S1 segments, SI joint and hip joint resulting in an anterior pelvic tilt, hyperflexion of the hip, compensatory lumbar hyperlordosis along with lateral shifting of lumbar, lateral leg rotation and knee hyperextension [3,4]. A deep and short lordosis leads to an imbalance in pelvic muscles, but if, lordosis is shallow and extends into the thoracic area, then imbalance is mainly in trunk muscles[4,5,6].

Janda observed that due to the ill effects of prolonged static posture, side effects of a sedentary lifestyle, the hip flexors become shortened and tight [7,8,9]. Therefore, the brain automatically starts to shut down or inhibit glutei muscles presented on the opposite side.[7] Now, the imbalance pattern promotes increased lumbar lordosis due to anterior pelvic tilt & hip flexion contractures and overactivity of hip flexors compensating for weak abdominals [10,11].

Limited hip extension because of the tightened psoas and the presence of inhibited antagonistic gluteus maximus creates a poor quality of hip extension. Now the contralateral lumbar erector spinae and ipsilateral hamstring have to be overactive and eventually tight to perform required hip extension instead of gluteus maximus [3,10,12,13].

LCS is one oppressive combination of biomechanical muscle imbalance, leading to exceeding stress on low back structures and thus causing low back pain (LBP) [13]. People with these features complain of LBP and if left unchecked these imbalances can cause chronic pain conditions, which becomes harder to deal with later [13,14].

Individuals in the age category of late teens to 40 years are most active in daily life activities and are most susceptible to various stresses. Unlikely, in elders' life span related changes are least [15,16]. In 1996, Burton A. K's study depicts the chances of developing low back pain in young adolescents as resembling that of adults [17,18,19,20]. The annual occurrence of LBP in children of age 11-15 has increased from 11.8% to 21.5%. For 5 years lifetime chances of LBP occurrence have increased from 11.6% at the age of 11 to 50.4% at age 15 years [17,21,22,23].

Janda found some features of the muscle imbalance in young children as of age 8 years. An attribute of muscle tightness is seen between ages 8-16 and then remains perpetual. In his study he noted, that muscle imbalances in children begin with the upper extremity while in adults it starts with the lower extremity. The muscular reaction is distinctive for every joint, thus along adaptive changes within the sensory-motor system affect the entire system, in a progression from proximal to distal-most often. [3,4,10,13,]

Janda proposed that the root cause of today's society having muscular imbalance is aggravated by stress, fatigue, and lack of movement through regular physical activity. [4,23,24,25,26]

Muscles have an aptness to be either tight or weak in dysfunction was discovered by Janda. Poor posture and ergonomics lead to the overloading of muscles, leading them susceptible to being tight. Muscles vulnerable to tight are found to be weak, whereas muscles subjected to weakness are sometimes found tight. Janda in his LCS study model proposed that due to tonic in nature, the hip flexors and spinal extensor muscles are liable to progress in tightness and similarly, the phasic nature of gluteus maximus and abdominal muscles are vulnerable to developing weakness. [27,28,29,30,31,32]

G T Jones et al have shown that the lifetime chance of occurrence of LBP is as high as 70-80% by 20 years of age. Several studies have calculated new outburst rates to be around 20% over a 1- year period [13,25,33,34,35,36].

Birgun et al contrived that 85% of LBP has root cause due to muscular imbalance commonly because of long-lasting postural deformity called pelvic crossed syndrome [13,37,38,39].

Among the usage of Numeric pain rating scale (NPRS) in comparison to Visual analog scale (VAS), VAS has been found as easy to manage and score and has been acceptable to patients but older patients with the cognitive disorder have strenuous perception and completing the scale whereas chronic patients Select NPRS over other measures due to articulateness and adroitness of completion. [40,41,42]

NPRS has been found to be reliable in both literate and illiterate patients (r = 0.96 and 0.95, respectively) whereas VAS has been shown considerate results, but higher among literate (r= 0.94, P= 0.001) than illiterate patients (r = 0.71, P= 0.001) [43,44,45,46]

Validity of NPRS was manifested to be tremendously corresponding with the VAS in patients with debilitated and other chronic pain conditions: correlations range from 0.86 to 0.95 while VAS showed to be highly corresponding to a 5-point verbal illustrative scale and a numeric rating scale: correlations differing from 0.71–0.78 and 0.62–0.91, respectively) [6,43,44,47,48,49,]

Oswestry disability index (ODI) is an admissible instrument to compute disability due to LBP among the population. Oswestry inscribes a wider abstraction of disability than directly associating to pain intensity. Along with having a high test-retest reliability, Oswestry is having a high validity suitable for measurement of patients having LBP as it takes less amount of time to be filled and can be used in the diversification of investigations and clinics. [25,29,50,51,52,53,54]

2. Materials and Methods

2.1. Subjects

30 participants, both male and female have participated in this study who met the inclusion criteria between the age group of 21-31 years. The subjects were diagnosed LCS with the help of MMT, Flexi Curve, Goniometer.

- MMT to check the strength of abdominals, gluteus maximus
- Goniometer to check the length of iliopsoas and
- Flexi Curve for spinal extensors

A survey including 22 single decision questions prospected for this year's study. Common extensive exploration regarding age, sexual orientation, height, weight, ability to manage activities in everyday life, and pain rating were inquired. The stature and weight of every human subject were utilized to ascertain the relating Body Mass Index (BMI).

All the selected participants (n=30) were asked to fill out a Google form in which their pain grade by Numeric Pain Rating Scale (NPRS) and disability index by Oswestry Disability Index (ODI) were recorded and calculated.

2.2. Type Of Study Data Collection

Cross-Sectional Study

2.3. Study Sampling

Convenient sampling

2.4. Data Collection

Number of samples – 30

The patients with Lower Crossed Syndrome were diagnosed at B.M Gupta Hospital Pvt. Ltd., Uttam Nagar, New Delhi, C.B.S.M- Physiotherapy & Rehabilitation services centre, Dwarka sector 13, New Delhi and BENSUPS Hospital, Dwarka Sub-city, Sector 12 Dwarka, BENSUPS Avenue, New Delhi.

2.5. Study Duration

4 months.

2.6. Inclusion Criteria

Participants had to be from the ages of 21 - 31 years old.

Complains of pain in hip flexors, groin, spine, or buttock muscles.

Reduced mobility or stiffness in lumbar, hip, hamstring, or pelvic region.

Tension in the lower back and/or buttock muscles.

2.7. Exclusion Criteria

- Spinal deformity
- Malignancy
- Joint replacement

2.8. INSTRUMENTATION: -

- Weighing Machine
- Marker
- Couch
- Pen
- Clipboard

2.9. MEASURING TOOL: -

- Goniometer
- Flexi Curve
- Oswestry Low Back Pain Disability Index (ODI) - It is a questionnaire which helps to determine the subjective perceived level of disability in everyday

life activities including pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life (if applicable), social life, travelling and thus helps in scoring a patient's ability to manage activities pretentious of low back pain.

If all sections are completed then scoring is done out of 50; but if one section is missed (or not applicable) then scoring is made out 45 and then percentage of low back pain disability is calculated and recorded. Six statements are scored 0 to 5, with first statement to be scored as 0 going to last one recorded as 5.

Disability index 0 to 20% is termed as minimum disability, 21 to 40% is stated as moderate disability, 41 to 60% is recorded as severe disability, 61 to 80% is called crippled and subject with 81 to 100% disability index is entitled as bed bound or exaggerating their symptoms.

- Numeric Pain Rating Scale (NPRS) -It is a linear scale in which is actually a unidirectional, segmented numeric version of visual analogy scale (VAS) which is used to measure the pain intensity in an individual.

NPRS is anchored by terms expressing pain severity with 'no pain' at 0 on the extreme left of the scale and 'worst possible pain' to be on extreme right at 10; Between these two there is 'moderate pain' at 5.

Subject individual is asked to mark their corresponding pain intensity with pain right now, usual pain level, best pain level, worst pain level during last week on a scale of 1- 10.

2.10. Procedure

Righteous and ethical approval was taken from the institutes along with proper consent to be taken form understudy individuals. Subjects were selected in accordance with inclusion criteria, and elucidated the entire process in detail. Participants were insinuated with the main aim and need of this study before instigation of online population-based survey (Google forms).

30 subjects both male and female were diagnosed with lower crossed syndrome from various health care centers such as B.M Gupta Hospital, C.B.S.M- Physiotherapy & Rehabilitation services Centre, BENSUPS Hospital.

Each subject is asked to fill demographic details such as name, age, gender, height, weight, etc. Following two questionnaires i.e., Oswestry Low Back Pain Disability Index (ODI) and Numeric Pain Rating Scale (NPRS) were asked to be filled by the understudy participants.

Data was analysed using SPSS software. Result and conclusion were drawn from the same. Scales used in this research are NPRS 4 questions and Oswestry low back pain disability index 10 questions.

2.11. Demographic Details of Participants

Data was accumulated from 30 selected contributors; Out of which 13 were male and 17 females. Mean age of participants was found to be 26.3. Participant's BMI was calculated using weight and height recorded via survey. Mean BMI of the participants was recorded 22.9. It was made certain that an unbiased selection of candidates from the respected age group (21-31 Yrs.), meeting the inclusion criteria, be equally matriculated in this research study.

3. Results

Table 1. Descriptive Stats (Mean, Standard deviation) of the participants

S. No	Demographic variable	Mean ('$\bar{X}$')	Standard deviation ('σ')
1.	Age	26.3	2.95
2.	Height	166.37	6.98
3.	Weight	63.67	10.13
4.	BMI	22.9	2.25

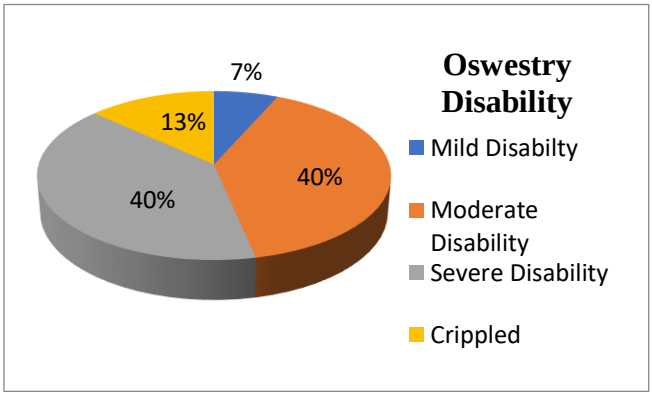

Figure1. Pie chart count of Oswestry Disability Grade

Table 2. Descriptive Stats (Mean, Standard Deviation) of Oswestry Disability

	Mean	Standard Deviation
Oswestry Disability Index	19.466	7.514

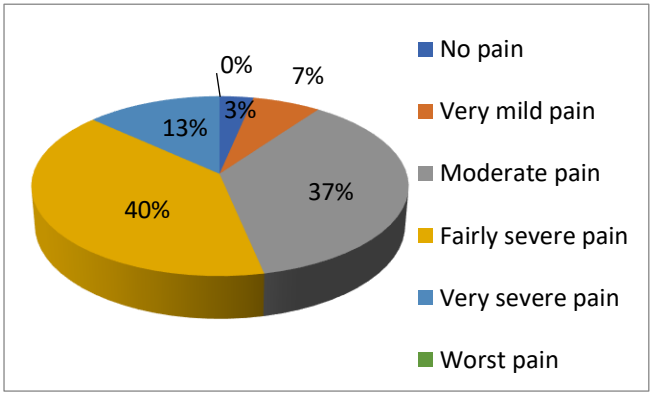

Figure 2. Oswestry pain intensity grade

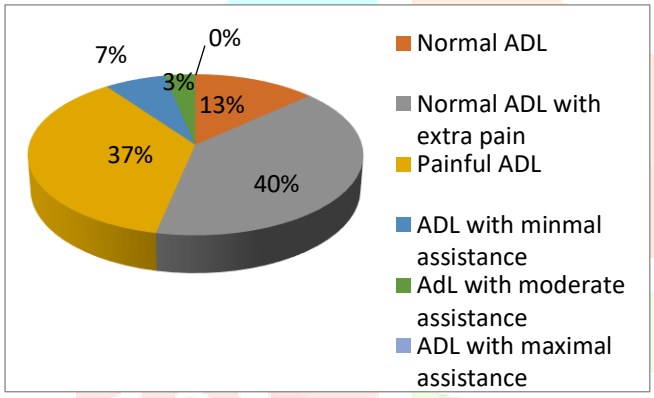

Figure 3. Oswestry personal care disability

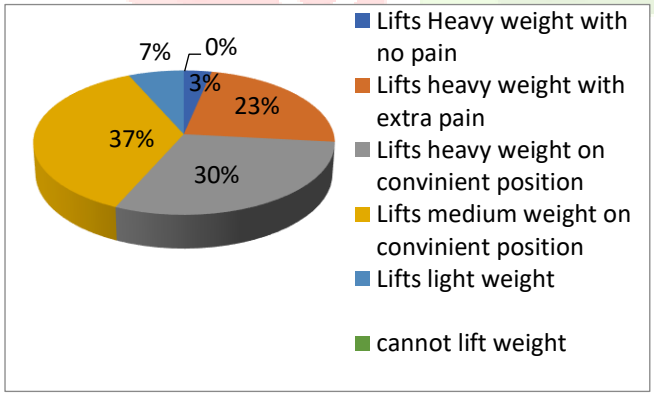

Figure 4. Oswestry lifting disability

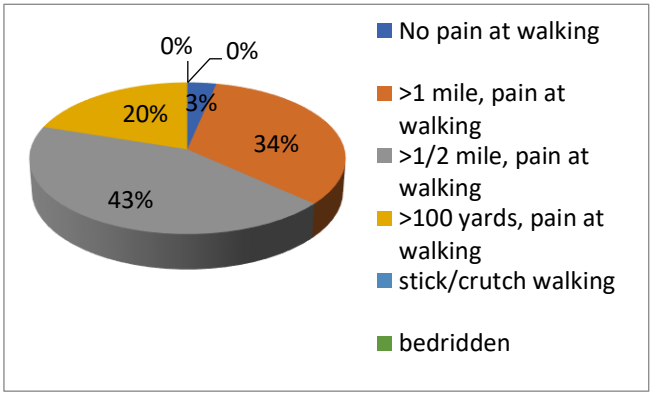

Figure 5. Oswestry walking disability

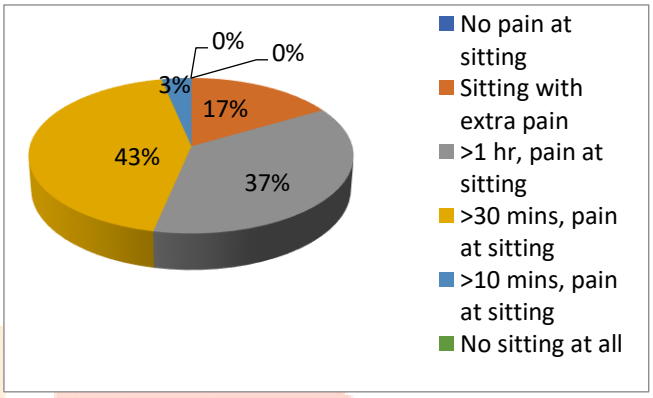

Figure 6. Oswestry sitting disability

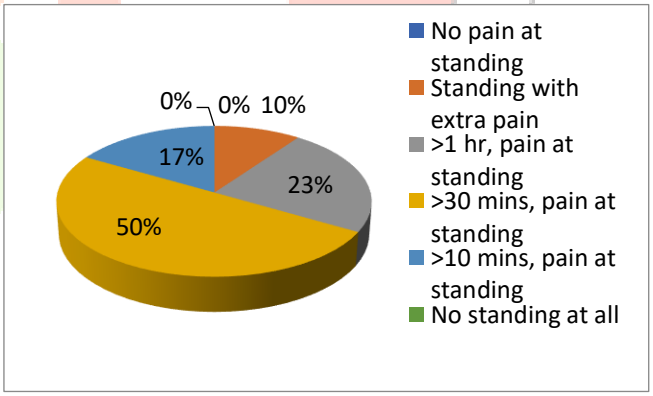

Figure 7. Oswestry standing disability

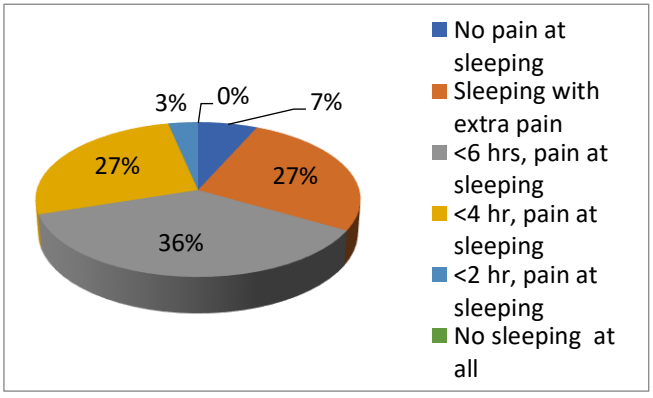

Figure 8. Oswestry sleeping disability

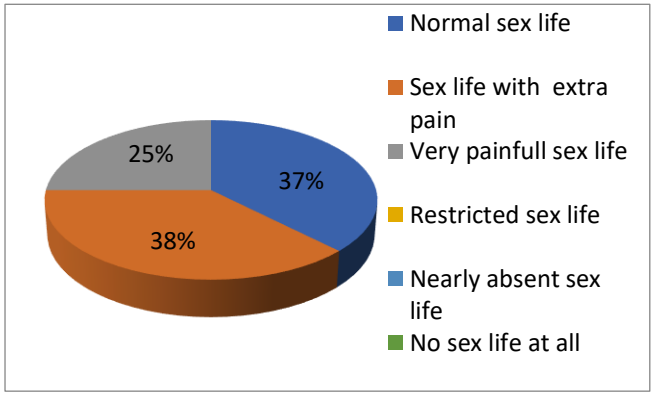

Figure 9. Oswestry Sex Life Disability

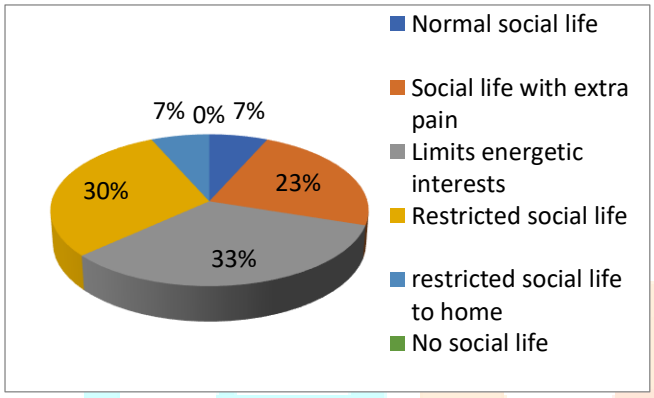

Figure 10. Oswestry Social Life Disability

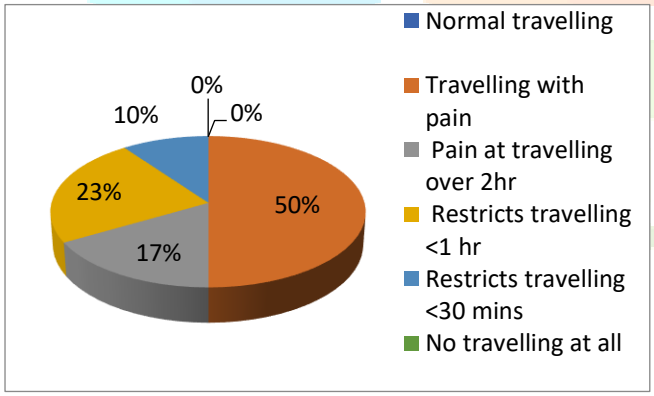

Figure 11. Oswestry Travelling Disability

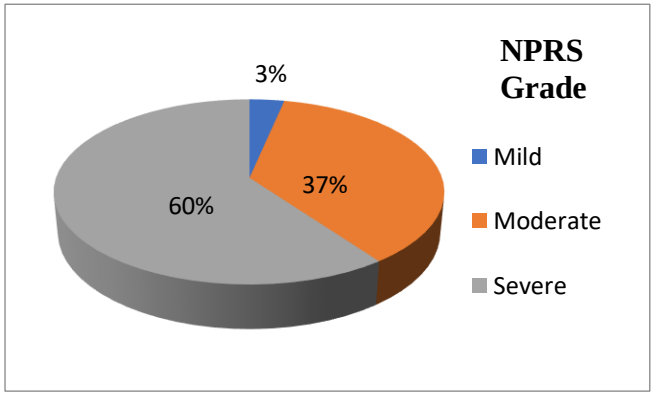

Figure 12. Pie chart count for Pain numeric rating scale grade

Table 3. Descriptive stats (Mean, Standard deviation) of Numeric Pain Rating Scale

	Mean	Standard Deviation
Numeric Pain Rating Scale	7.391	1.702

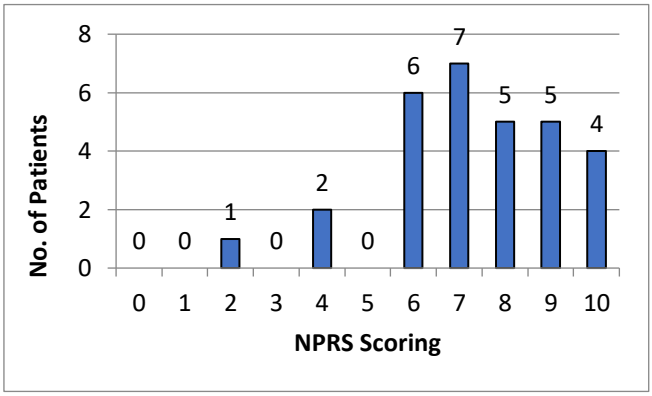

Figure 13. NPRS (Pain Right Now)

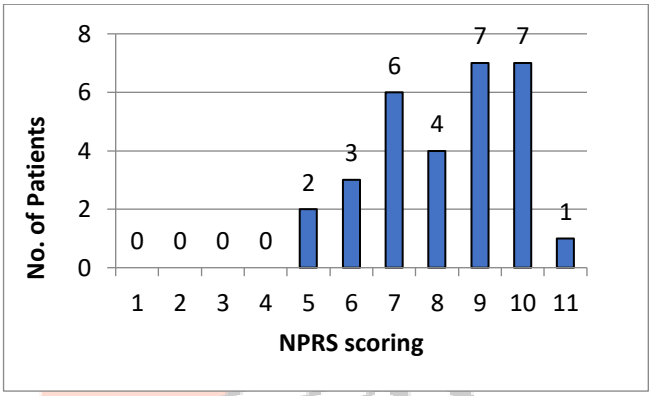

Figure 14. NPRS (Usual Pain during last week)

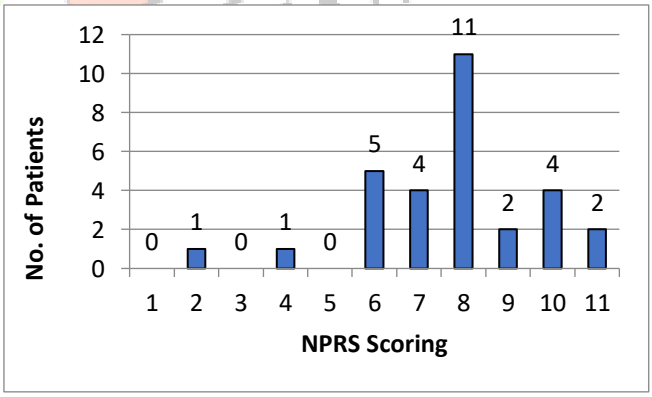

Figure 15. NPRS (Best Pain during last week)

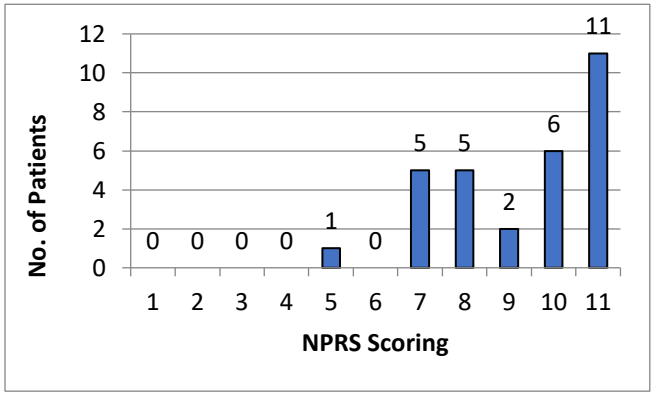

Figure 16. NPRS (Worst Pain during last week)

4. Discussion

Muscle disparity is one the key factor associating low back pain in young adults. Lower crossed syndrome (LCS) is a specific sequence of tight hip flexors & lumbar extensors in combination with weakness of deep abdominal muscles & gluteus maximus muscle; an alteration in force distribution in this muscular group region progresses to low back pain [10,27,31,55,56,57]. As there is a lack of literature stating disability and pain in young adults due to Lower crossed syndrome thus, this study was designed in such a way to scrutinize the disability and pain grade in Lower crossed syndrome among young adults after accumulation of data through online survey.

30 volunteers of age range 21- 31 years were selected for this study having lower crossed syndrome; so, in order to assess disability and pain grade among them. The demographic details (age, gender, weight, height, BMI) were analysed via calculation of mean and standard deviation to see the homogeneity between genders.

After data examination the experiment portrays that Lower Crossed Syndrome disability among young adults as 40% (moderate and severe) according to Oswestry Disability Index.

Also, our study depicts that there is 60% (severe pain intensity) according to Numeric Pain Rating Scale. (Figure no.1 and 12).

Janda proposed the three main important and crucial factors in muscle tightness are muscle length irritability, threshold and altered requirement. An alteration in length- tension relationship is usually depicted by tighter muscles which are shorter than normal. [10,58,59,60,61,62]

An increase in tension from active or passive structure leads to muscle tightness. Spasm or contraction can actively progress a muscle shortening while passively, postural adaptation or scarring leads to muscle shortening. Nevertheless, of the reason, a tightness in muscle leads to limited range of motion producing a muscular imbalance. In young population there is a period of rapid growth; during this soft tissues i.e. muscles and ligaments can't keep their momentum with rate of maturation of bone and thus leading to decreased flexibility and imbalance in muscle[20,36,63,64,65] This study depicts that among young adults revealed that due to increased stress on associated muscles, improper posture, one sided stress or high tension in certain areas along weight person being overweight progresses to a certain improper muscle tightness and weakness leading to LCS. Due to sedentary lifestyle, increased work load, young generation with their fast-moving life and busy work schedule they neglect their health and suffers from various problems and out of which one of the major problems is lower crossed syndrome [66,67,68]

Similar to our investigation, a study was conducted such that it depicted prevalence of lower crossed syndrome among young male and female and prevalence of its occurrence among those.

Shriya Das et., al demonstrated that Lower Crossed Syndrome occurs more commonly between the age group of 21 to 31 years. Females are more prone to develop LCS than male of same age group. [69 ,70]

5. Conclusion

This study has shown that lower crossed syndrome in young adults with prevalent low back pain that corresponds to inactivity or difficulty in performing activities.

In our study 7% mild, 40% moderate, 40 % severe & 13 % crippled were found to be affected by LCS in terms of disability according to Oswestry Disability Index while 3% have mild, 37% have moderate and 60% have severe pain intensity according to Numeric pain rating scale.

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