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## Effectiveness of Back Strengthening Exercise on Pain and Disability among the Nursing Students with Mechanical Low Back Pain

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### ABSTRACT

**Introduction:** Health is a fundamental right. Every human being has the right to enjoy the highest attainable standard of health. According to WHO, health is a state of complete physical mental, social and spiritual well being, not merely an absence of disease or infirmity (Potter PA, Perry AG, 2010). The musculoskeletal system is particularly vulnerable to external forces. These forces can cause alteration in structure of bone or soft connective tissue, resulting in functional disruption. The consequences may be deformity, alteration of body image, mobility, pain or permanent disability. These problems may produce long term health problems that interfere with activities of daily living and quality of life (Lewis SM, Heitkemper MM, Dirksen SR, 2007).

**Materials and Methods:** A pre experimental study was carried out to assess the effectiveness of back strengthening exercise on pain and disability among nursing students with mechanical low back pain in Index Nursing College, Indore.

The objectives of the study were to assess the intensity of low back pain and disability before and after the back strengthening exercises, assess the effectiveness of back strengthening exercise on low back pain, disability and associate the level of low back pain with selected demographic variables. One group pre-test post-test design was used and Purposive sampling technique was applied.

**Results:** Samples were selected using case detection proforma. 60 students who met the inclusion criteria were recruited for the back strengthening exercise intervention. The intervention was carried out daily for 30 minutes for duration of 30 days. The severity of low back pain and disability before and after the intervention were assessed using the Numerical pain rating scale and Modified Oswestry Low Back Pain Disability Questionnaire respectively. Analysis revealed that the post test pain and disability score was significantly less than the pre-test pain and disability score.

**Conclusion:** Thus back strengthening exercise was found to be effective in reducing low back pain and disability among the nursing students. There was no significant association among the pre-test pain score and the selected demographic variables like age, height, weight, course of study, year of study, activities aggravating low back pain.

**Key words:** effectiveness; back strengthening exercises; mechanical low back pain; disability; nursing students

## 1. INTRODUCTION

Low back pain is a universal experience among adults and the prevalence of disabling back pain has increased greatly during the past 20 years. This increase has been attributing to society's expectations of management for back pain (Lewis SM, Heitkemper MM, Dirksen SR, 2007 ).

Musculoskeletal disorders (MSD) constitute a major proportion of all registered and/or compensable work-related diseases in many countries, representing a third or more of all registered occupational diseases. The physical ergonomic features of work that are most frequently cited as musculoskeletal disorder risk factors include rapid work pace and repetitive motion patterns, insufficient recovery time, heavy lifting and other forceful manual exertions, non-neutral body postures (either dynamic or static), mechanical pressure concentrations, vibration (both segmental and whole-body), and low temperature (Punnett. L, 2005).

Low back pain is extremely common worldwide. Almost every person will have at least one episode of low back pain at some time in his or her life. The pain can vary from mild to severe and from short term to long term. It resolves within a few weeks for most people (Hoy O, Brooks P, Blyth F, Buchbinder R, 2010).

## 2. MATERIALS AND METHODS

In order to accomplish the objectives of the study a quantitative approach was used for the study. In the present study the researcher used a one group pre-test post-test design which is a pre experimental design. One group pre-test post-test design is the simplest type of pre-experimental design, where only the experimental group is selected as the study subjects. In the present study the independent variable is the back strengthening exercises ( McKenzie's extension exercises) and the dependent variables are the mechanical low back pain and disability among the nursing students.

The study was conducted at Index Nursing College, Indore, which has both General nursing, midwifery and basic BSc nursing courses which was mainly the target population. The sample consists of 60 nursing students from BSc and general nursing students with mechanical low back pain.

From a total population of 194 nursing students excluding the first years, samples were identified with a case detection Proforma which contain questions to rule out and exclude non-mechanical low back pain cases. A sample of 60 students who meet the criteria was selected. The data collection instruments used were case detection Proforma, demographic Proforma, Numerical pain rating scale and Modified Oswestry Low Back Pain Disability Index.

## 3. RESULTS

### Section 1: Distribution of the subjects according to demographic variables.

The demographic variables of the subjects are described in terms of age, height, weight, religion, course of study, year of study, family history of low back pain, activities aggravating low back pain.

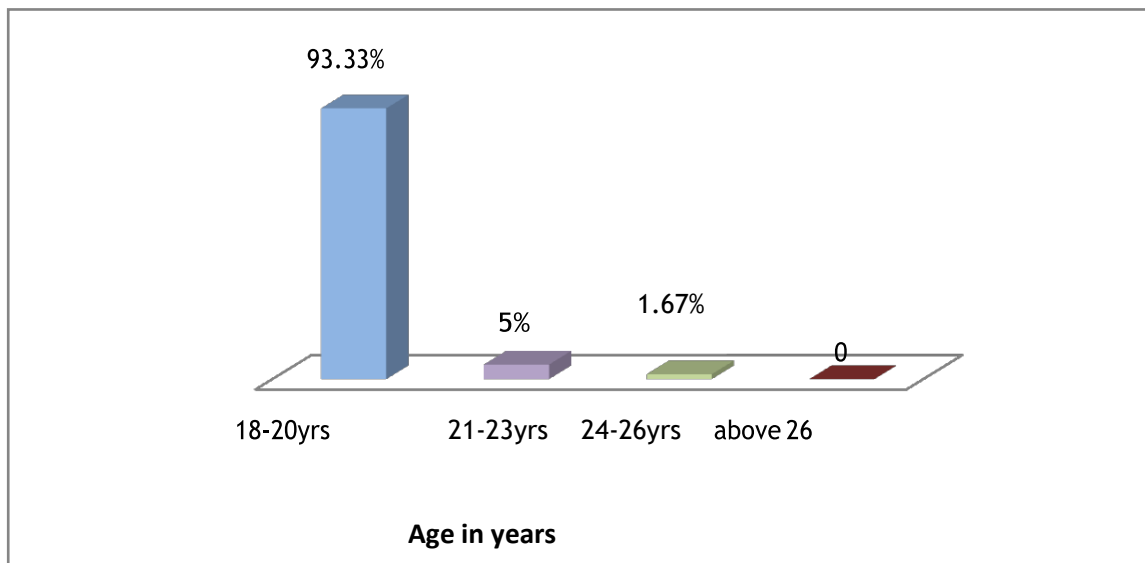


Fig 3.1: Percentage distribution of subjects according to their age

Figure 3.1 shows that the maximum number of subjects 56 (93.33%) belongs to age group of 18-20 yrs and 3(5%) belongs to age group 21-23yrs. 1 (1.67%) belongs to age group 24-26 yrs. There are no students above the age of 26.

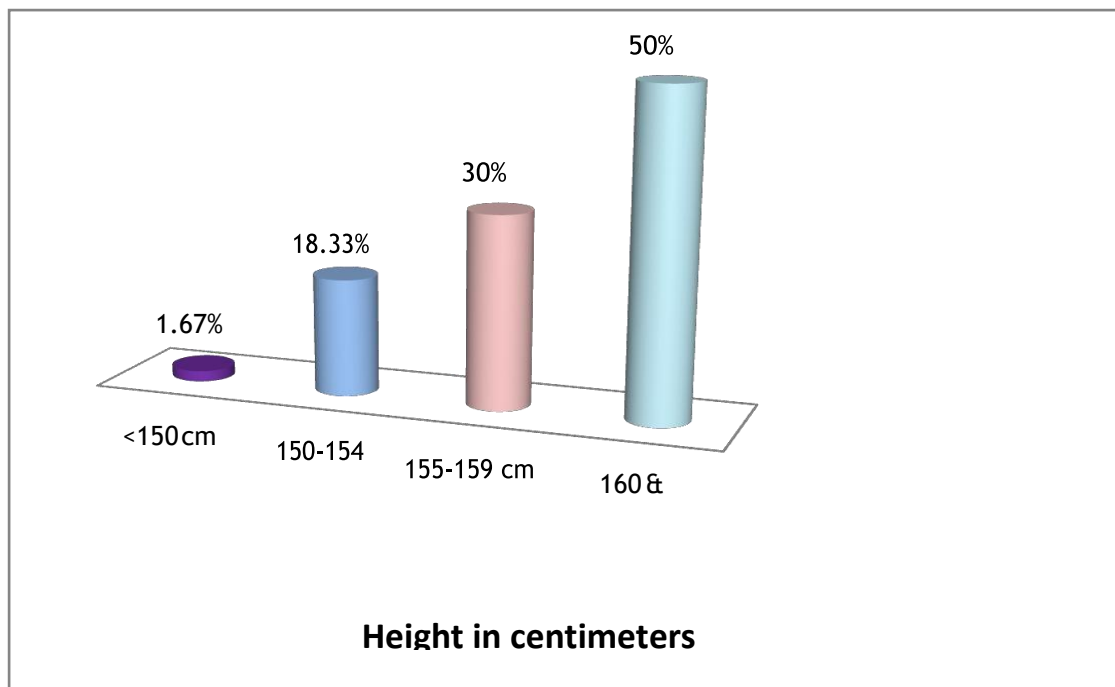


Fig 3.2: Percentage distribution of students according to their height

Fig 3.2 show that the Majority of the students 30 (50%) had height 160cm and above. 18 students (30%) had 155-159 cm height and 11 students (18.33%) had 150-154 cm height. Only 1student (1.67%) had <150 cm height.

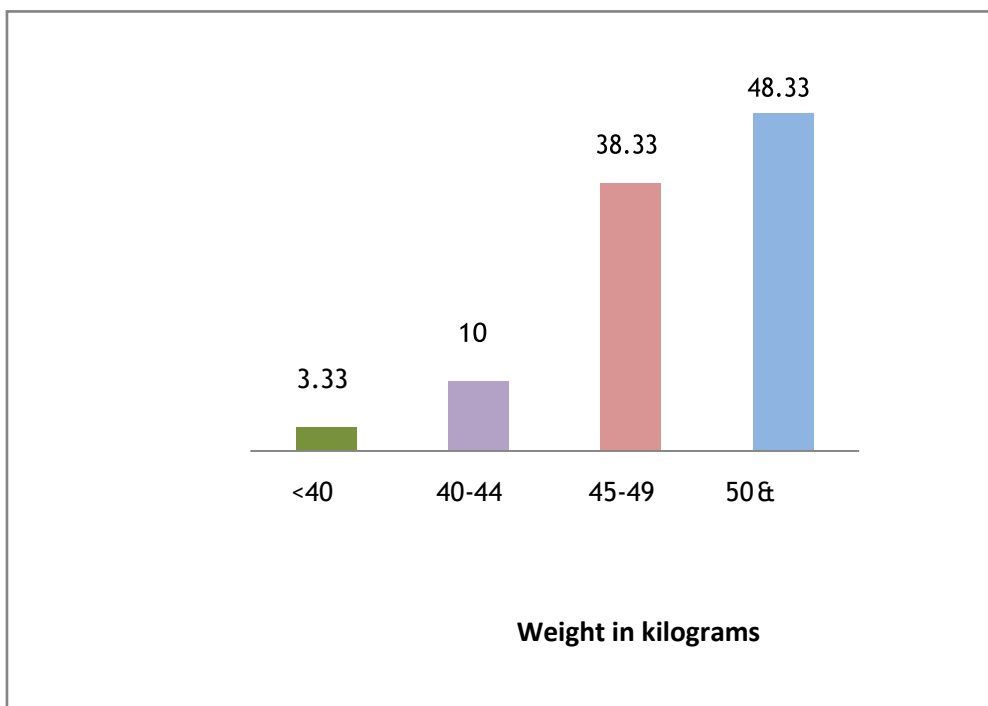


Fig 3.3: percentage distribution of students according to their weight

Fig 3.3 Implies that the maximum number of students 29 (48.33%) had 50 Kg and above weight. 23 students (38.33%) had 45-49 Kg weight and 6 students (10%) had 40-44 Kg Weight and only 2 students (3.33%) had <40 Kg weight.

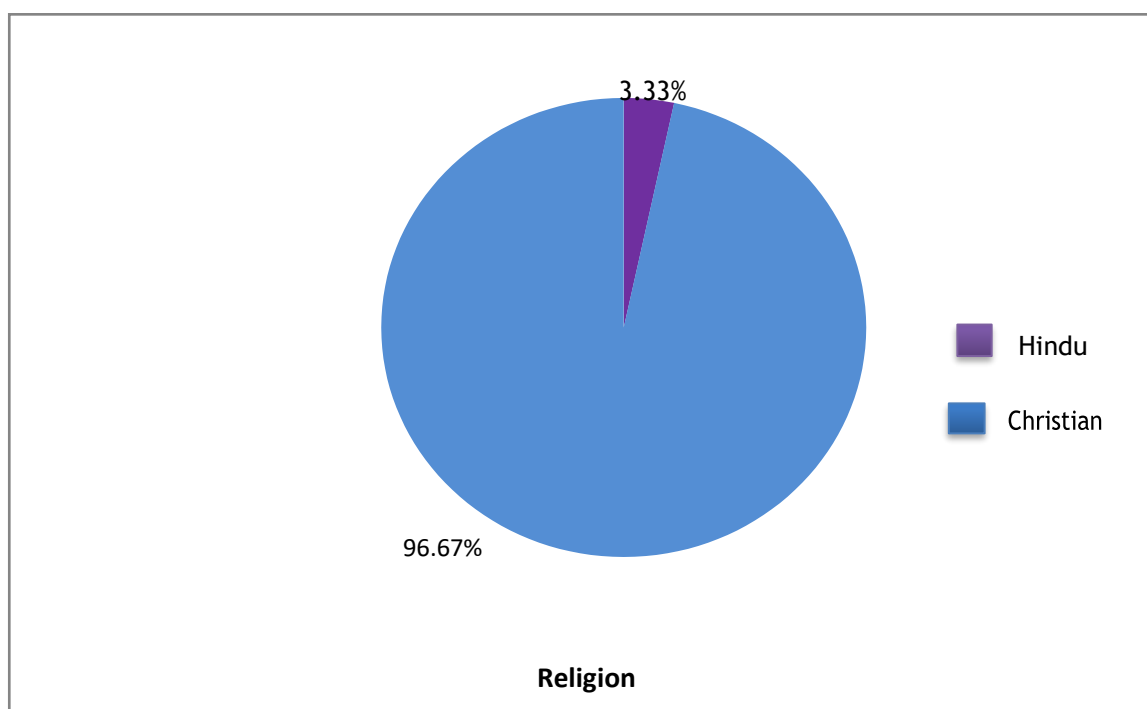


Figure 3.4: Percentage distribution of subjects according to religion

Figure 3.4 shows that majority 96.67% of the students were Christians and 3.33% of the students were Hindus.

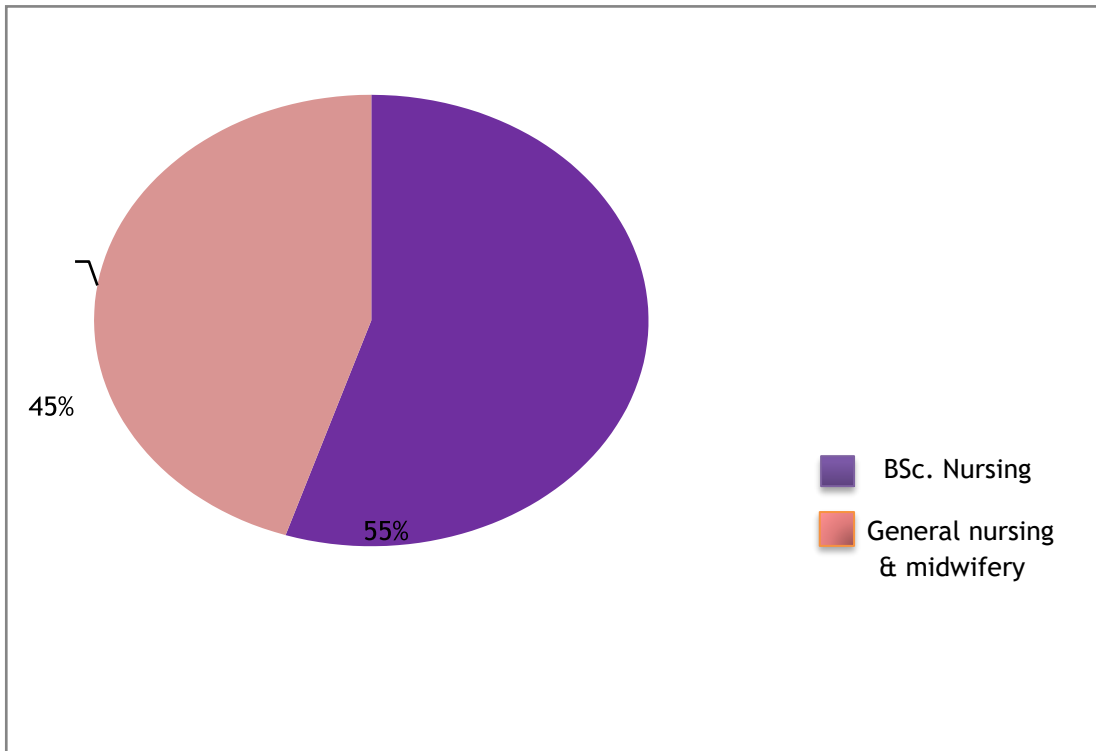


Fig 3.5: percentage distribution of students according to course of study

Figure 3.5 shows that 55% of the students were belong to BSc.Nursing and 45% of the students were belongs to General Nursing and Midwifery course.

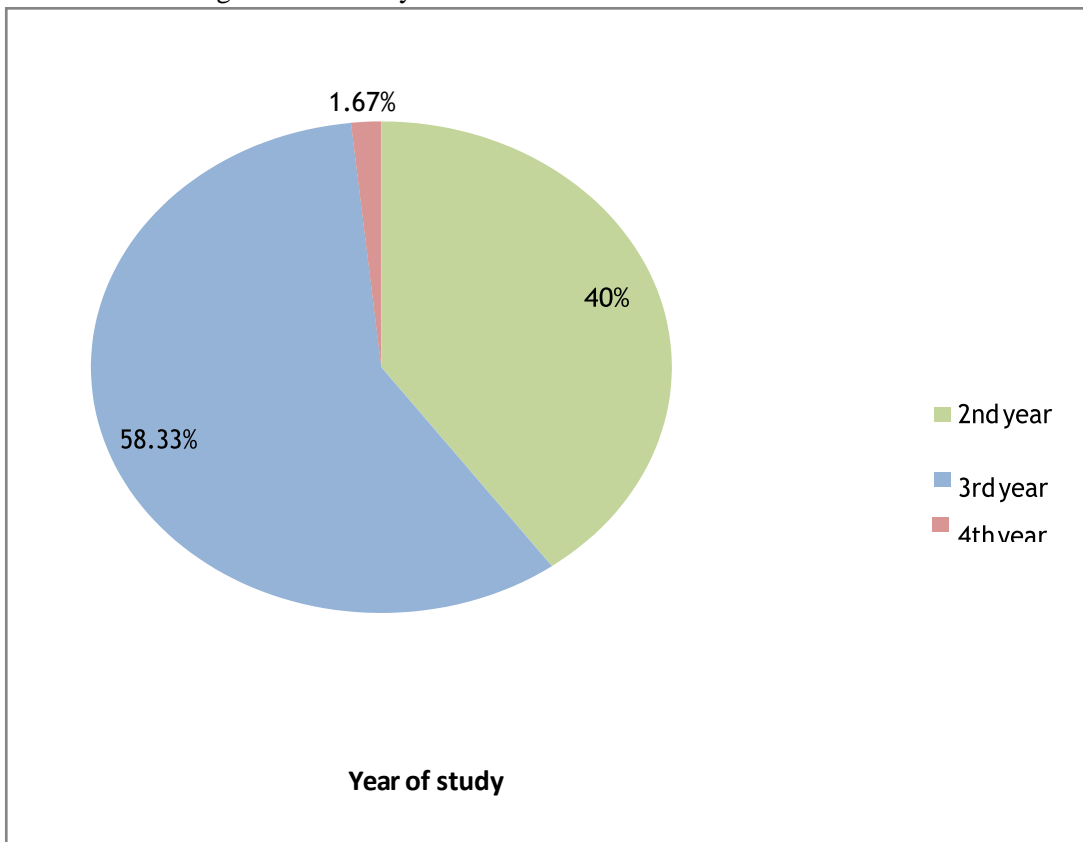


Figure 3.6: Percentage distribution of students according to their year of study

Figure 3.6 shows that 58.3% of the students belong to 3<sup>rd</sup> year nursing, 40% of the students belonging to 2<sup>nd</sup> year and 1.67% of the students belonging to 4<sup>th</sup> year.

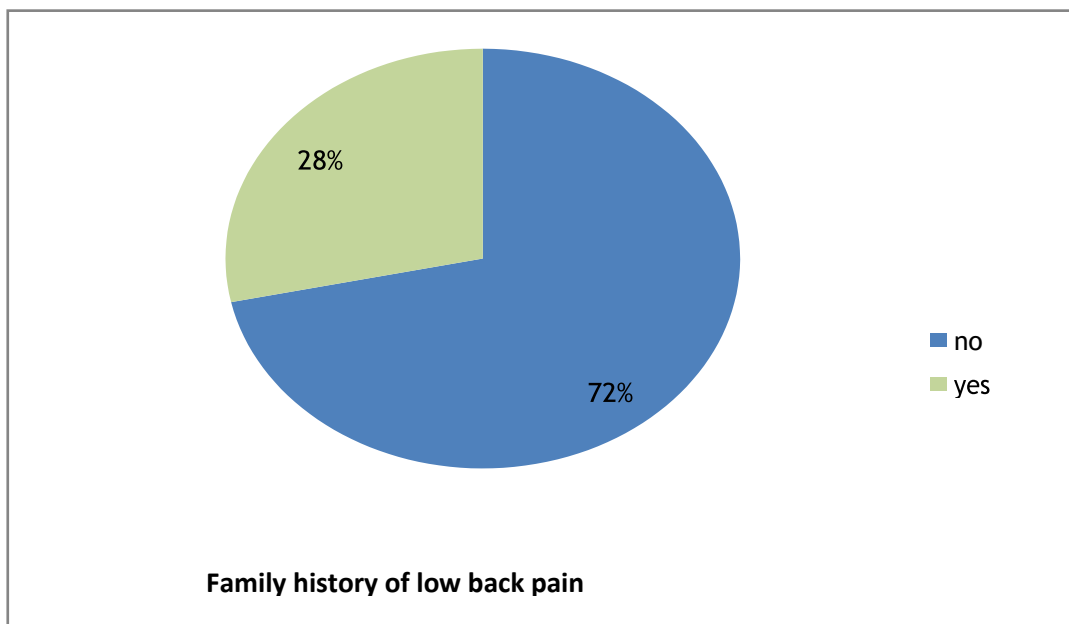


Figure 3.7: Percentage distribution of samples according to family history of low back pain

Figure 3.7 shows that 72% of the students had no family history of low back pain and 28% of the students reported family history of low back pain.

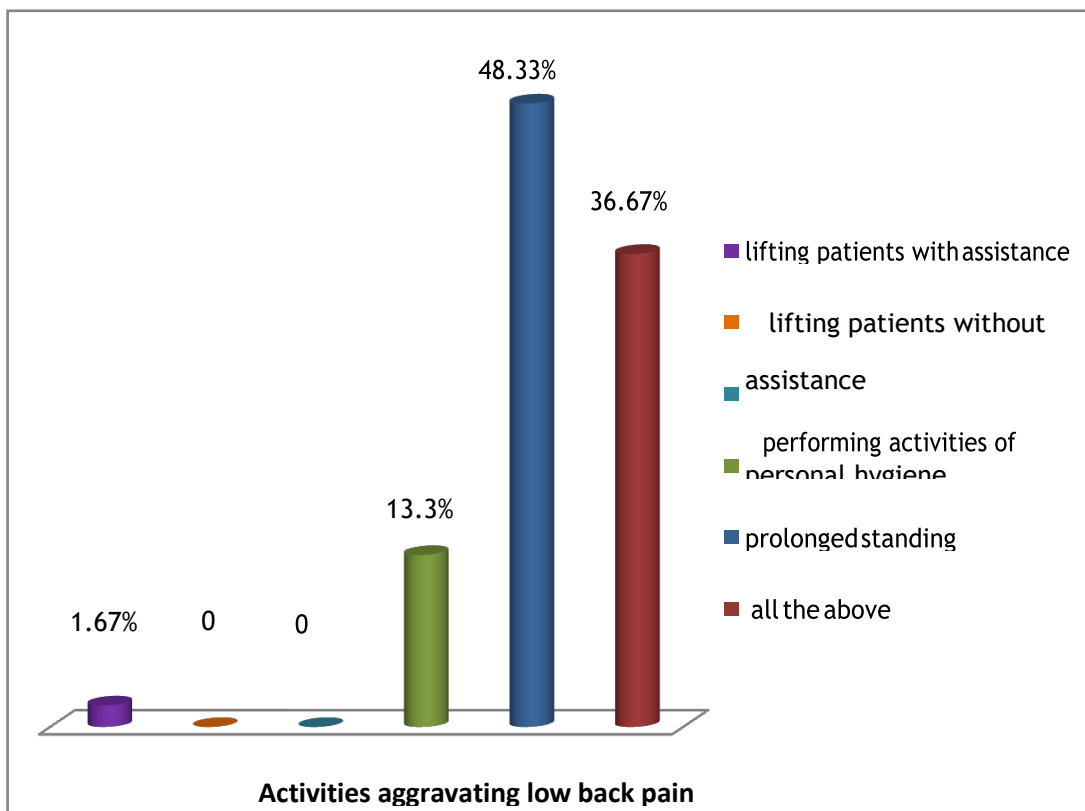


Figure 3.8: Percentage distribution of the students according to the activities aggravating the low back pain

Figure 3.8 shows that majority of the students (48.33%) reported that prolonged standing is the activity that aggravates low back pain. 1.67% of the students reported lifting patient with assistance is the activity that aggravates low back pain and 13.3% of

the students reported bending during procedures aggravates the low back pain. 36.67% of the students reported that all the above activities aggravates low back pain.

**Section II: Distribution of subjects with referent to pre test and post test score.**

This section deals with the percentage distribution of samples according to their pre- test and post -test scores on pain and disability.

**Table 1: Frequency and percentage distribution of sample according to pre- test pain score (n=60)**

<b>Intensity of pain</b>	<b>frequency (F)</b>	<b>percentage (%)</b>
No pain	0	0
Mild pain	10	16.7
Moderate pain	42	70
Severe pain	8	13.3

Data presented in the table 1 show that 70% of the samples had moderate intensity of low back pain, 16.7% had mild intensity of low back pain, 13.3% had severe intensity of low back pain and none of the samples reported any low back pain during the pre- test assessment of pain.

**Table 2: Frequency and percentage distribution of the sample according to pre-test level of disability (n=60)**

<b>Level of disability</b>	<b>frequency (F)</b>	<b>Percentage (%)</b>
0%-20% mild	24	40
20%-40% moderate	30	50
40%-60% severe	6	10
60%-80% crippled	0	0

Data presented in the Table 2 shows that 50% of the students had moderate disability, 40% had mild disability and 10% had severe disability during the pre -test assessment on level of disability

**Table 3: Frequency and percentage distribution of the samples according to post-test pain score (n=60)**

<b>Intensity of pain</b>	<b>frequency (F)</b>	<b>percentage (%)</b>
No pain	3	5
Mild pain	55	91.7
Moderate pain	2	3.3
Severe pain	0	0

Data presented in table 3 shows that 91.7% of the students had mild pain, 5% had no pain and 3.3% had moderate pain. No one had severe pain after the back strengthening exercises.

**Table 4: Frequency and percentage distribution of the samples according to post-test level of disability (n=60)**

<b>Level of disability</b>	<b>frequency (F)</b>	<b>Percentage (%)</b>
0%-20% mild	50	83.3
20%-40% moderate	10	16.7
40%-60% severe	0	0
60%-80% crippled	0	0

Data presented in Table 4 shows that 83.3% of students had mild level of disability and 16.7% had moderate level of disability after the back strengthening exercises.



### Section III: Effectiveness of back strengthening exercise on low back pain and disability

For studying the effectiveness of back strengthening exercises on low back pain and disability, the scores related to intensity of pain and level of disability were assessed before and after the administration of back strengthening exercises. Paired 't' test was used to find out the statistical significance of difference in scores between pre- test and post- test. Reduction in the intensity of pain and level of disability as

evidenced by a significant difference in scores indicates the effectiveness of back strengthening exercises.

#### Comparison between pre- test and post- test pain scores

H<sub>1</sub>: the post- test pain score after the back strengthening exercises will be significantly lower than the pre- test pain score in nursing students.

**Table 5: Comparison between pre- test and post- test pain scores**

(n=60)

Pain score	Mean	Standard Deviation	Paired	„P“
			„t“ value	value
Pre-test	4.95	1.17	19.94**	0.000
Post-test	1.93			

\* \* Highly significant at 0.001 level table value,  $t_{(59)}=3.46$

Data presented in the table 5 shows that the mean pre- test pain score was 4.95 and that of post- test pain score was 1.93. There was significant difference in the mean scores before and after the administration of

back strengthening exercises. The calculated t value is greater than the table t value at  $p = 0.001$ . Thus the research hypothesis H<sub>1</sub> was accepted.

### Comparison of pre-test and post-test level of disability

H<sub>2</sub>: The post -test disability score after back strengthening exercise will be significantly lower than the pre -test disability score in nursing students.

**Table 6: Comparison between pre- test and post-test level of disability**

(n=60)

Level of Disability	Mean	Standard deviation	Paired „t“ value	„P“ Value
Pre test	0.24	0.084	12.91**	0.000
Post test	0.10			

\*\*Highly significant at 0.001 level

The data presented in the table 6 shows that the mean post -test disability (0.10) was less than the mean pre -test disability (0.24). The calculated t value is greater than the table t value at  $p = 0.001$ . Hence the research hypothesis H<sub>2</sub> is accepted.

#### Section 4: Association of pre-test pain score with selected demographic variables.

The selected demographic variables like age, height, weight, course of study, year of study and activities aggravating low back pain of the nursing students were associated with the pre- test pain scores. Chi-square test was used to find the association.

To test the association between the pre-test pain scores and selected demographic variables, the following null hypothesis was stated and tested using chi-square.

H<sub>02</sub>: there will be no significant association between the pre-test pain score and the selected demographic variables such as age, height, weight, course of study, year of study and activities aggravating low back pain.

**Table 7: Association between Pre -Test pain score and selected demographic variables**

(n=60)

Sl. No:	demographic variables	X <sup>2</sup> value	Df	level of significance
1.	Age	0.32	1	p>0.05
2.	Height	0.004	1	p>0.05
3.	Weight	0.84	1	p>0.05
4.	Course of study	2.00	1	p>0.05
5.	Year of study	0.14	2	p>0.05
6.	Activities aggravating low back pain	2.80	3	p>0.05

Table value: X<sup>2</sup> (1) = 3.84, X<sup>2</sup> (2) = 5.99, X<sup>2</sup> (3) = 7.82

The data presented in table 7 shows that there is no significant association between the demographic variable and low back pain. So the research hypothesis is rejected and H<sub>02</sub> is accepted.

#### 4. DISCUSSION

##### **Assess the intensity of low back pain before and after the back strengthening exercises**

In this group most (70%) of the samples had moderate pain whereas 13.3% samples had severe pain and the remaining 16.7% had mild pain.

##### **Assess the level of disability before and after the back strengthening exercises**

In this group majority (50%) of the samples had moderate level of disability, where as 40% of the samples had mild level of disability and 10% of the samples had severe level of disability before the back strengthening exercises. After the back strengthening exercises the majority (91.7%) of the samples had mild pain and 3.3% of the samples had moderate pain and 5% had no pain. The findings of this study is consistent with other studies with Bureau of Labour

Statistics, 2002, Nelson A, Fragla G, Menzel Nancy, 2003, Smith DR, Sato M, Miyajima T,2003.

##### **Assess the effectiveness of back strengthening exercise on pain and disability**

This study revealed that the mean pre-test (4.95) pain score was greater than the mean post-test (1.93) pain score. The statistical test reveals that the reduction of low back pain is highly significant t=19.94 (p=0.00) which is less than 0.01 level of significance. The findings of this study is consistent with other studies with June KJ & Cho SH,2010, Nair RR & D'silva,2011, Moffett JK, Torgerson D & Bell-Syer S et.al,1999.

##### **Conclusion**

The present study aimed to find the effectiveness of back strengthening exercises on pain and disability among nursing students with mechanical low back

pain. The study results shows that there was significant ( $p=0.00 < 0.01$ ) reduction in pain among nursing students after the back strengthening exercises. It also shows a significant difference in mean pre-test and post-test pain score. So the back strengthening exercises was effective in reducing the pain among nursing students with mechanical low back pain. The mean pre-test (0.24) disability score was greater than the mean post-test (0.10) disability score and  $p=0.00$ , which is less than 0.01 level of significance.

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