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CORRELATION OF LOW BACK PAIN WITH BODY MASS INDEX, FUNCTIONAL REACH TEST AMONG FEMALE NURSING PROFESSIONALS

¹Shameela .T .V²Veena Pais³Shaikhji Saad³Nusaibath M

ABSTRACT

Background: Among health care workers the highest level of work related back injuries are more affected in nurses. There were many studies done to assess low back pain by using different tools. So this study aimed to identify the prevalence low back pain disability among female nursing professionals and the association between BMI, functional reach test and low back pain, so that a better tool can be used during the clinical examination for the betterment of the patient. The objective of the study is to identify the prevalence of low back pain disability, the association of Low Back Pain(LBP) with BMI and functional reach test among female nursing professionals.

Methods: A total of 256 subjects were assessed for disability due to back pain using OswestryLBP Disability Questionnaire and the prevalence of disability was determined. The sit and reach test, forward reach test and their BMI were calculated for those who had a disability score of 20 and above (n = 87).

Results: Data was analyzed using Pearson's correlation. The study result showed a significant correlation (p = 0.03) of sit and reach test with low back pain disability scores. There was a negative correlation seen among BMI and LBP disability score forward reach test and LBP disability score, and BMI and no low back pain disability score.

Conclusion: The prevalence of LBP disability among nursing professionals was 33.9%. This study suggest that sit and reach test can be used as an indicator of low back pain. Whereas BMI and forward reach test do not indicate low back pain.

Keywords: Low back pain, BMI, Sit and reach test, Forward reach test, Oswestry low back pain disability questionnaire, Female Nurses.

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CORRESPONDING AUTHOR

¹Shameela .T .V

Yenepoya Physiotherapy College,
Yenepoya University,
Mangalore, India

Assistant Professor,
Yenepoya Physiotherapy College,
Yenepoya University, Mangalore, India.
Yenepoya Physiotherapy College,
Yenepoya University, Mangalore, India.

INTRODUCTION

Among health care workers Musculoskeletal disorders are one of the most frequent health problems related to working condition.¹ Musculoskeletal disorders, predominantly low back pain, were found to effect the working population of both developed and developing countries.² A Study have shown that among young population aged less than 45 years low back pain is the common cause of activity limitation and among them nursing profession is the third leading occupation in the prevalence of low back pain.³

Studies conducted in western countries have shown a prevalence of 63% of low back pain in nursing professionals while Indian population have shown a prevalence of 48.2% .^{4,1} The highest level of work related back injury are more effected in nurses compare to other health care works. This is due to great amount of physical work involved in their profession such as manual handling and transferring of patients.² Dissatisfaction with working condition, mental stress from work and lower physical fitness were stated to be reasons for higher prevalence of low back pain in nursing females.⁵

Body mass index is defined as the weight in kilograms divided by the square of the height in meters.⁶ Higher body mass index were found to increase the risk of low back pain as the force acting on the back increase two or three times the body weight during the normal daily activities.⁷ A prospective study has shown that physical inactivity and high BMI are associated with an increased risk of chronic pain in the low back and neck/shoulders in the general adult population.⁸

The loaded forward reach test was clinically useful to measure chronic low back pain.⁹ The Functional Reach test can be administered while the patient is standing (Functional Reach) or sitting (Modified Functional Reach).¹⁰⁻¹³ Studies of Forward Reach Test have also demonstrated strong reliability and validity.¹⁴ Sit and reach test are commonly used to evaluate the hamstring and low back flexibility.¹⁵ For these reasons it is included in fitness testing protocols, specifically as a measure of low back and hamstring flexibility. A study reported that the sit-and-reach test appears valid and reliable in comparison to other modified versions of the test.¹⁶⁻¹⁸

There were many studies done to assess low back pain by using different tools. In this present study forward reach test and sit and reach test were used as the tool to access low back pain in nursing female professionals as the studies done by using these tools and their comparison to access low back

pain are very limited. So this study aimed to identify the prevalence low back pain disability among female nursing professionals and the association between BMI, functional reach test and low back pain, so that a better tool can be used during the clinical examination for the betterment of the patient.

MATERIAL AND METHODS

This was a cross sectional study conducted on 256 female nurses aged between 20 to 35 years. Subjects were excluded if they were pregnant, menstruating, had any deformity in upper or lower limbs, or had a history of recent surgery/ trauma to any part of the body, or a known case of spinal stenosis or any neurological conditions.

The approval of the institute's ethics committee was taken prior to the commencement of the study. The purpose and methodology of the study was explained to subjects in a language they understood. A written consent was taken and participants had the right to withdraw at any time from the study. The detail of occurrence of low back pain was assessed using the Oswestry Low Back Pain Disability Questionnaire. Questionnaires were distributed at selected hospitals and colleges, of which all were filled and returned. Eighty seven (33.9%) subjects reported with low back pain as per Oswestry low back pain disability questionnaire score of 20 and above, only these subjects were further assessed with forward reach test, sit and reach test, and BMI was then calculated based on convenience. One hundred and sixty nine (66%) subjects who reported of no low back pain disability were only assessed for their BMI score.

Measurement of Body Mass Index (BMI)

The body mass was calculated for each subject by dividing their body weight in kilograms (kgs) by the square of the height (h^2) in meters. All subjects were weighed on the equilibrated portable balance scale which was at zero prior to each weighing to ensure accuracy. The weight was taken without shoes and with light cloth is only. Weight was read to the nearest 100g and the standing height was measured without shoes using a tape measure which was fixed to the wall. The subject was standing erect, so that the line of sight was horizontal while the heel and back was in contact with the wall. The distance from the sole of feet to the top of the head was then measured and recorded.

Forward Reach Test (FRT)

To perform the forward reach test, a measurement tape was fixed on a wall at a height suitable for the participant. After demonstration, participant was given one practice trial and three test trials. The

participant was standing by the wall with feet together and the left arm was raised in front horizontally and 3rd metacarpal held at the 0-cm of the measurement tape. On a signal, the participant leaned forwards, moving the hands forward along the measurement tape as far possible while keeping the heels in contact with the ground and Point in level with the 3rd metacarpal was recorded. Performance was assessed based on the maximal distance the participant could reach forward beyond arm's length, without taking a step. Measurement was recorded in inches. Each subject performed three trials and the mean of the three trials was recorded.

Sit and Reach Test (S&RT)

Sit and reach test- the participant sat on the floor with hip flexed, knee extended and feet flat against the box and the hands with the fingers extended were placed parallel in line with the shoulder width, to avoid the influence of scapular flexibility and trunk flexibility, the head was placed in a neutral position. With one hand on the top of the other, the participant was asked to slowly slide the hands to the top of the box until maximum reach was attained. The participant then performed three reach tests and the mean of the results was calculated from the three trials Measurement was taken in centimeters.

STATISTICAL ANALYSIS

Data was analyzed using SPSS version 17 software. The mean and standard deviation of the age, height weight, BMI, FRT, SRT was calculated and the mean scores and SD of subjects with LBP disability and no LBP disability was calculated based on scores from Oswestry low back pain disability questionnaire. Data was statistically analyzed using Pearson's Correlation Coefficient test. Level of significance was set at $P < 0.05$.

RESULTS

TABLE-1: Shows Demographic Data of Low Back Pain

Gender/no	F/87	
	Mean	SD*
Age (years)	21.29	1.50
Height (cm)	154.96	5.15
Weight(kgs)	49.91	5.489
BMI (kg/m ²)	20.87	2.45
Forward reach test(inches)	8.14	2.51
sit and reach test(cm)	18.04	6.43
Low back pain disability score (%)	25.73	7.65

*SD- standard deviation

TABLE 2: Shows Demographic Data of no Low Back Pain Disability Group

Gender/no	F/169	
	Mean	SD*
Age (years)	22.69	2.36
Height (cms)	154.77	5.06
Weight(kgs)	49.15	5.63
BMI (kg/m ²)	20.56	2.59
Low back pain disability score (%)	7.74	5.66

*SD- standard deviation

As evident from table 3, there was a moderate negative correlation of S&RT with low back pain disability. There was a weak negative correlation of FRT with low back pain disability, BMI with low back pain disability and BMI with no low back pain disability. Significant correlation of sit and reach test with low back pain disability was noted.

Table 3: Shows Correlation Study

Correlation	r*	P value
Correlation between BMI and LBP disability score	-0.063	0.56
Correlation between forward reach test and LBP disability score	-0.102	0.345
Correlation between sit and reach test and low back pain disability score	-0.233	0.03
Correlation of BMI and no low back pain disability score	-0.007	0.92

*r- correlation coefficient

DISCUSSION

This study was done with the intention to determine the prevalence of low back pain disability in nurses and nursing students posted at the various departments in hospitals and its relation with the functional reach tests, sit and reach test and their BMI.

During the study a total of 256 questionnaires (Oswestry Low Back Pain Disability Questionnaire) were distributed among the target subjects and all were duly filled and returned yielding a response of 100%. And those who turned up with a score of 20 and above (87 subjects) were selected and assessed with functional reach test and sit and reach test. Their BMI was then calculated. In this study the Oswestry Low Back Pain Disability Questionnaire was used to evaluate the disability that resulted from back pain in the subjects.

Several studies have made use of this questionnaire in evaluating the disability resulting from LBP.

Megan Davidson, Jennifer L Keating et al conducted a study to examine 5 commonly used questionnaires for assessing disability in people with low back pain and the measurements obtained with the modified Oswestry Disability Questionnaire, the SF-36 Physical Functioning scale, and the Quebec Back Pain Disability Scale were found to be the most reliable and showed sufficient width scale to reliably detect improvement or worsening in most subjects.¹⁹

With the initial assessment of the 256 subjects with Oswestry Low Back Pain Disability Questionnaire the prevalence of low back pain was found to be 33.9% of LBP disability. Many studies have concluded that nurses have one of the highest rates of musculoskeletal disorders of any occupation. In a survey done by Deepak B. Anap, Chandra Iyer et al on the work related musculoskeletal disorders (WMSD) among hospital nurses in rural Maharashtra, India, it was found that 89.1% nurses had experienced work-related musculoskeletal pain or discomfort at some time in their occupational lives and the WMSDs was highest in the low back (48.2%).¹ Subjects who turned up with a score of 20 and above were then assessed with forward reach test and sit and reach test and their BMI was also calculated.

The sit-up and sit-and-reach tests are commonly used youth and adult fitness tests because of their perceived relation between performance on these tests and low back pain. However, this relationship has not been well validated. In present study there was negative correlation between the sit and reach scores and Low back pain disability score which indicate that sit and reach distance decrease with increase back pain and is statistically significant with $P = 0.03 (P < 0.05)$.

Besides the sit and reach test the subjects also performed forward reach tests and the scores were recorded. The results showed a negative correlation between the forward reach test scores and low back pain disability. The result shows that P value is greater than the 0.05 which indicates that forward reach decreases with increase the LBP. Nagar VR, Hooper TL et al carried out a study to measured transverse abdomen (TrA) contraction during a loaded forward-reach activity while using the abdominal drawing in maneuver and examined if a nonspecific low back pain history affects transverse abdomini activity. And concluded that individual can use a volitional pre-emptive abdominal drawing maneuver for trunk protection

during loaded forward-reach, potentially reducing injury risk.²⁰

Both low back pain (LBP) and obesity are common public health problems, yet the relationship between them remains controversial. In this study the height and weight were measured and the BMI was calculated. A weak negative correlation was found between the BMI and the low back pain disability score which indicates that low back pain decrease with increasing BMI. A study was done by ValeriTs. Nikolov, Miroslava P. Petkova et al to investigate the association between body mass index (BMI) and the prevalence of LBP in postmenopausal women and the results showed that 23.7% of the investigated women reported chronic LBP and 73.5% of these women were obese and overweight and came to the conclusion that obese postmenopausal women often suffer from LBP and that the abdominal obesity might increase the risk of LBP.²¹

We hypothesized that BMI and SRT, FRT may be associated with LBP, but results of this study only showed a significant negative correlation between sit and reach test and low back pain, which was similar to the findings in other studies. However further studies are needed to ascertain the correlation between BMI, forward reach test and low back pain.

Limitations of study- only female subjects were included, another outcome measure could also have been incorporated, and Questionnaire was subjective tool and another outcome measure could also have been incorporated.

CONCLUSION

The prevalence of LBP disability among nursing professionals was 33.9%. There was a significant negative correlation of sit and reach test with low back pain and it can be used to assess low back pain. Whereas BMI and forward reach test did not show any significant correlation with low back pain.

SCOPE OF STUDY

Similar studies may be carried out in male nurses to check the influence of gender on low back pain. Similar studies can also be done by selecting nurses from different units.

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