

Screening of body composition, lower back flexibility and risks of back pain among the student nurse of a nursing school in North-East India

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Abstract

Background: Back pain is the most common reported work related musculoskeletal disorder among the nursing population. Focus on early screening and identification of body composition, lower back flexibility and risk of back pain among the student nurse may help to promote primary prevention strategies as a preliminary measure.

Methods: A descriptive study was carried out among 75 students of 1st, 2nd and 3rd year GNM (General nursing and midwifery) of a nursing school; where body composition, lower back flexibility and risk of back pain with keele start back screening were assessed. Descriptive data were represented by the number, percentage, range, mean and standard deviation of all the anthropometric parameters, flexibility testing and start back screening tools.

Results: 75 female GNM nursing students with a mean age of 19.2±1.54, 20.3±1.07 and 21.0±1.30 for 1st, 2nd and 3rd year respectively were assessed. Maximum weight and BMI was noted among the 2nd year student (53.3±14.26 and 22.4± 5.00), whereas 3rd year student had a maximum of waist/hip ratio with a mean of 0.89±0.03. For flexibility testing of lower back, minimum mean values of 7.4±11.34 in 3rd year and a maximum of 12.6±8.81 in 2nd year student noted. Based on keele start back screening, there were no high risk in 1st and 2nd year and only 6.67% of 3rd year were in high risk for back pain.

Conclusions: The present study concluded that periodic screening of physical fitness in academic period of the student nurse may be helpful in preventing the incidence of back pain in their professional life.

Keywords: Body composition, Flexibility, back pain, Nursing, musculoskeletal disorder.

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*Article History:

Received: 14/10/2019
Revised: 27/11/2019
Accepted: 27/11/2019
DOI: <https://doi.org/10.7439/ijbr.v10i11.5281>

QR Code



How to cite: Gogoi P, Deka K and Malsawmdawngliani. Screening of body composition, lower back flexibility and risks of back pain among the student nurse of a nursing school in North-East India. *International Journal of Biomedical Research* 2019; 10(11): e5281. DOI: 10.7439/ijbr.v10i11.5281 Available from: <https://ssjournals.com/index.php/ijbr/article/view/5281>

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1. Introduction

Worldwide, the registered nurses have a high prevalence of work related musculoskeletal disorders, particularly of the back. The commonest activities such as patient handling techniques and lifting present the highest risk of injury, activities that begin at the earliest in nursing school [1].

For back pain, risk factors can be either of individual or related to the work place. Lifting and handling of patient, awkward or an immobile posture, improper work place design, increasing working hours, variations in

healthcare centre were certain commonest occupational risk factors, whereas individual factors like level of physical activity, smoking, obesity and psychological state were major contributors for back pain among the nurses[2,3].

Although many studies reported that nurses are among the occupational group within the health service that are vulnerable to low back pain and a growing health concern, while it was also suggested regarding the beneficial effects of habitual exercise for the promotion of physical and mental health in female nursing students[4,5].

However, evidence clearly suggest that changes in body composition and lack of hamstring muscle extensibility leads to biomechanical changes in the pressure distribution of the spine and consequently may lead to spinal disorders such as low back pain, lumbar disc lesion etc. [6-8].

An evaluation of various anthropometric measures such as body mass index, waist and hip circumference, waist: hip ratio (W: H ratio) and flexibility testing for lower back/ hamstrings and presence of back pain may clarify the understanding of the likely pathological mechanisms. Although there is increasing evidence that changes in body composition and hamstring tightness is contributor to low back pain among the adult and middle aged population. Thus there is a need to determine the body composition, lower back flexibility and back pain among the nursing student as a preliminary measure to initiate primary prevention strategies among them who were in the merge of joining health care services.

2. Materials and methods

A descriptive study was carried out among the students of down town school of nursing, a constituent institution of down town hospital, Guwahati, the largest city of North-east India from October 2018 to February 2019. Total enumerative/consecutive sampling technique was used to select the participants where a total of 75 GNM (General nursing and midwifery) nursing students of 1st, 2nd and 3rd year were recruited for the study. The study was ethically approved by institutional review board and permission was obtained from the medical superintendent and principal of the institution. The students were informed about the objectives of the study and verbal consent was obtained from them. Female nursing student between the age group of 18-23 years who were able to understand English and willing to participate for the study were included. Students having history of any acute illness/ injury, on menstrual period, those on NSAIDs/attending any treatment session for musculoskeletal injury/lesions were excluded for the study.

Demographic variable were collected from each of the participants following which the participants were examined for various anthropometric parameters such as height, weight, body mass index, waist circumference, hip circumference, waist-hip ratio and lower back flexibility tested with classic sit and reach test.

Weight was measured using digital scale weighing machine to the nearest 0.1 kg and for the determination of height, the participants were made to take off their shoes, stand-up right with their head in the Frankfort plane with the heel, buttock and occiput against the wall. The height was recorded to the nearest 0.5 cm. Body mass index (BMI) was calculated as weight (in kilogram) divided by the square of height (in meters) and was categorised according

to the WHO classification. For waist and hip circumference measurements, the participants should stand with feet close together, arms at the side and body weight evenly distributed and relaxed and the measurements was taken at the end of a normal expiration. Waist circumference measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest using a stretch-resistant tape that provides a constant 100 g tension. Hip circumference measured around the widest portion of the buttocks with the tape parallel to the floor. Each measurement was repeated thrice and average of the three readings was calculated. Following which waist-hip ratio was calculated.

The classic sit and reach test was performed by the participants on barefoot with sitting on the floor with the legs stretched out straight ahead. The soles of the feet are placed flat against the box. Both knees were locked and pressed flat to the floor and their palms facing downwards, with their hands on top of each other or side by side. Then the participant was asked to reach forward along the measuring line as far as possible ensuring that their hands remain at the same level. The score was then recorded to the nearest centimetre or half inch as the distance reached by their hand.

For screening of low back pain among the participants, the Keele start back screening tools, a standardized and validated instrument [9] adopted from the Keele University was administered. It contained 9 statements related to back pain and its impact on the activities of daily living within last few days.

Data collected were grouped using MS Excel sheet. Descriptive data were represented by the percentage. The range, mean and standard deviation of all the anthropometric parameters and flexibility testing were analysed to differentiate the variation in quantitative data among the nursing students with respect to their 1st, 2nd and 3rd year of college. For assessment of back pain, the Keele start back screening tool has been classed as low, medium and high risk category in terms of number and percentage.

3. Results

A total of 75 female GNM nursing student were screened for their body composition, lower back flexibility and risks (Low/medium/high) of back pain where mean age were of 19.2 ± 1.45 , 20.3 ± 1.07 and 21.0 ± 1.30 for 1st, 2nd and 3rd year respectively. Among the students, only 4% were vegetarian in their diet and maximum number of 1st year student (37.33 %) were non-vegetarian. A maximum number of student 78.67% were native to urban areas and only 21.33 % were of rural area (Table 1). As shown in table 2; height, waist and hip circumference were maximum among the 1st year student with a mean of 154.6 ± 5.52 , 82.6 ± 9.64 and 92.5 ± 6.94 whereas maximum weight and BMI was noted among the 2nd year student (53.3 ± 14.26

and 22.4 ± 5.00) 3rd year student showed a maximum of waist/hip ratio of 0.89 ± 0.03 . For flexibility testing of lower back, minimum mean values of 7.4 ± 11.34 in 3rd year and a maximum value of 12.6 ± 8.81 in 2nd year student noted

(Table 3). Based on keele start back screening (table 4), there were no high risk group among the 1st and 2nd year and only 6.67% of 3rd year were in high risk.

Table 1: Demographic characteristics in college year-wise distribution

Participants characteristics	1 st Year	2 nd year	3 rd year
Age (Mean \pm SD)	19.2 \pm 1.45	20.3 \pm 1.07	21.0 \pm 1.30
Diet in no. (%)			
Vegetarian	-	3(4)	-
Non-vegetarian	28(37.33)	24(32)	20(26.67)
Residence community in no. (%)			
Rural	11(14.67)	4(5.33)	1(1.33)
Urban	17(22.67)	23(30.67)	19(25.33)

Mean \pm SD = Mean and standard deviation, no. (%) = in number and percentage

Table 2: Participants characteristics of body composition in college year-wise distribution

Body composition	1 st Year		2 nd year		3 rd year	
Height(cm)	138-163	154.6 \pm 5.52	132-167	153.7 \pm 7.56	137-166	151.9 \pm 7.97
Weight(kg)	42-81	51.9 \pm 9.13	35-85	53.3 \pm 14.26	35-66	41.8 \pm 8.04
Waist circumference	51-102	82.6 \pm 9.64	61-113	79.8 \pm 11.9	69-88	78.6 \pm 5.17
Hip circumference	84-111	92.5 \pm 6.94	77-112	91.3 \pm 9.51	80-98	87.9 \pm 5.33
Waist/hip ratio	0.5-1.0	0.80 \pm 0.08	0.79-1.01	0.87 \pm 0.05	0.84-0.95	0.89 \pm 0.03
Body mass index (kg/m ²)	17.3-31.4	21.7 \pm 3.53	16.0-34.7	22.4 \pm 5.00	14.4-26.2	21.5 \pm 3.01

Range = minimum and maximum value, Mean \pm SD = Mean and standard deviation

Table 3: Participants characteristics of lower back flexibility in college year-wise distribution

Classic sit & reach test	1 st Year		2 nd year		3 rd year	
	Range	Mean \pm SD	Range	Mean \pm SD	Range	Mean \pm SD
	-11.0 - 24.0	11.5 \pm 10.84	-8.0 - 26.0	12.6 \pm 8.81	-8.0 - 40	7.4 \pm 11.34

Range = minimum and maximum value, Mean \pm SD = Mean and standard deviation

Table 4: Participants characteristics of risk group based on keele start back screening tools in college year-wise distribution

	1 st Year			2 nd year			3 rd year		
	Low risk	Medium risk	High risk	Low risk	Medium risk	High risk	Low risk	Medium risk	High risk
Number of student (n)	24	4	-	22	5	-	9	6	5
Percentage (%)	32	5.33	-	29.33	6.67	-	12	8	6.67

n = number, % = percentage

4. Discussion

In particular, this descriptive study examined the body composition, lower back flexibility and screening for low, medium and high risk among the female student nurses with a view to provide support for the growing evidence that nurses were more prone to low back pain and other musculoskeletal problems. Work related musculoskeletal disorders are highly prevalent among nursing professionals [10, 11] and the most frequent complaints are low back pain [10, 12]. Therefore, there is a necessity to promote the need of primary prevention strategies with posture education and improving physical fitness among the student nurses during their training period itself.

The multi-factorial nature of musculoskeletal disorders shows the need for a risk evaluation. Therefore,

the present study, adopted the keele start back screening, a standardised and validated tool for classifying the student nurse into low, medium and high risk [9]. With this screening, we found out that only 3rd year student (6.67%) were in high risk and 20% of the total participants were with medium risk which indicates that as the year progresses in training institution, the level of risk increases in students. From this result, it can be concluded that percentage of medium risk student increased, whereas number of low risk students were found to be less in academic year-wise which thereby may increase the chance of future risk of musculoskeletal disorder among them.

The evaluation of flexibility which is one of the important components of physical fitness was also considered in this study by measuring lower back and

hamstring flexibility with classic sit and reach test with the aim for prevention of musculoskeletal injury and impaired posture. The overall result in classic sit and reach test has shown the variation in the flexibility values of range(minimum-maximum) and mean from 1st year to 3rd year of academic activity. With this context the classic sit and reach test, a dynamic flexibility test where the intrinsic property of body tissues, including muscles and connective tissues that determines the range of motion achievable without injury at a joint or group of joints[13], would be the probable factor for variation of values in the result.

Our present study result showed that all the 1st, 2nd & 3rd year students were with optimal body mass index as per WHO classification of BMI, while in one of the study on young female students of nursing where age ranged from 18-25 years showed prevalence rate of obesity with 30.6% [14]. Measuring waist circumference may be helpful, in addition to measuring BMI, since it provides an estimate of increased abdominal fat even in the absence of a change in BMI. The waist and hip circumference analysed with this study were in the normal ranges as per the WHO MONICA project [15]. Whereas W: H ratio showed higher than normal values in 2nd and 3rd year students which signifies the chances of risk may be prevalent. In the INTERHEART study, it was stated that out of different anthropometric measures waist-hip ratio shows the strongest association with the risk of myocardial infarction. Moreover this ratio was the strongest predictor of myocardial infarction irrespective of age, sex, lipid level, blood pressure [16, 17].

Taking everything into account, the present study showed that 2nd year student nurse were on the verge of facing unexpected risk factor which may in future develop work related musculoskeletal disorders. Therefore it is required for up-bringing of systems which implements periodic screening of physical fitness in their academic tenure and education of posture, benefits of physical exercise. Though the study has been confined to a single centred and with a smaller samples of nursing student population, we tried to reflect the different variables which may in future helps to lessen the incidence of work related musculoskeletal disorder. A further research should include the different component of physical fitness with association of health related quality of life and its impact on musculoskeletal disorder on a larger sample from wider geographical areas.

5. Conclusion

With a high prevalence of work related musculoskeletal disorders and high risk of injury among the nursing population, the present study concluded that periodic screening of physical fitness in academic period of the student nurse may be helpful in preventing the incidence of back pain in their professional life.

Acknowledgements

Authors would like to thank Dr. Udayan Barua, Medical superintendent and Nursing school Principal Mrs. Meghali Deka, down town hospital ltd. Guwahati, Assam India for their continuous support and encouragement.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Institutional Ethical Board, Down Town Hospital ltd. Guwahati, India.

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