Original Article

Body composition parameters as predictors of low back pain in rural homemakers of North India

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Abstract

Background: Homemakers are the backbones of families, but in rural India, females suffer from many musculoskeletal problems due to excessive workload in their houses. The objective of the present study is to compare body composition parameters as predictors of low back pain (LBP) in nonworking rural homemakers of North India. **Materials and Methods:** The study was conducted among 296 homemakers from rural areas of Lucknow district in Uttar Pradesh. Details of LBP and body composition parameters (body mass index, body fat, visceral fat) were taken. **Results:** The prevalence of LBP among homemakers was found to be 15.54%. BMI was found to be a better predictor of LBP than body fat and visceral fat. The risk of LBP is 7.24 times higher in BMI ≥23 than in women with BMI <23. The risk of LBP is 3.67 times more in visceral fat % ≥10% than in women with visceral fat % <10%. **Conclusion:** Age, type of family, socioeconomic status income was identified as risk factors in this population. Maintaining an adequate BMI is essential for the prevention of LBP.

Keywords: Back, BMI, homemakers, pain, parameters, predictor

Introduction

Low back pain (LBP) is one of the most prevalent musculoskeletal conditions in the world[1] and a major contributor to reduced physical activity and work absences[2] which results in a burden on the health sector and finance.[3]

Sixty to 80% of persons will experience low back discomfort at some point in their lives. Growth spurts and increased physical activity, according to some authors, could lead to LBP in children and young people.[4] In contrast, Fairbank *et al*.[5] revealed that students experiencing back pain were more inclined towards avoiding sports than their peers without back pain. The associated modifiable and nonmodifiable risk factors must be understood in order to prevent LBP. Previous research has demonstrated a connection between being overweight or obese (high BMI) and having a higher incidence of LBP.[6] Risk factors for LBP include not just physical variables but also psychosocial ones as stress, anxiety, despair, and boredom. These risk factors may cause an acute LBP episode to turn into a chronic problem. Low back pain is considered to be multifactorial; hence, assessment of predictors becomes essential.[7] Despite a significant illness load, most episodes of back pain have a structural basis that is unclear, and they are frequently regarded as nonspecific. Risk factors associated with LBP include female sex, older age, education, occupation, income, and high body weight.[8]

The objective of the present study is to compare body composition parameters as predictors of low back pain (LBP) in nonworking rural homemakers of North India and to assess other risk factors of LBP.

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Materials and Methods

A cross-sectional study was conducted from May to December 2019 in the population residing in the catchment area of RHTC (Rural Health and Training Centre) of a Medical College in Lucknow district, Uttar Pradesh, India. The study population comprised full-time homemakers in the age group 26–65 years. The sample size was estimated to be 225 considering an expected prevalence rate of 83% (LBP among homemakers),[9] with absolute precision of 5%. However, all 296 subjects were included in the study. The sampling technique used was multistage sampling. In the first stage, two subcenters were selected out of four subcenters in the catchment area of RHTC (Rural Health and Training Centre) by simple random sampling. The second stage involved selecting six villages randomly from each subcenter. Then population proportionate sampling was done to select homemakers from each village. A random table was used to select households from the village. One homemaker of the age group 26–65 years was selected randomly from each household.

A pretested questionnaire was used to collect details of each subject. Any history of low back pain in the last 7 days was noted using a Nordic questionnaire.[10] The bioelectric impedance method (Model: OMRON Hbf 375) was used to analyze body composition. The variables included body mass index (BMI), body fat percentage (BF%), and visceral fat percentage (VF%). VF was divided into three categories: low (9.5), high (>9.5–14.5), and extremely high (>14.5–30.0). BF% was classified as normal (20–<30) and high/obese and overweight (≥30).[11]

Height and weight were measured as per standard methods.[12] The BMI of the subjects was classified into underweight, normal, overweight, and obese based on WHO Asian-based classification. BMI of <18.5 for underweight, 18.5–22.9 for normal weight, 23.0–27.5 for overweight, and >27.5 for obese women.[13]

MS Excel was used to compile and analyze data. Chi-square, Student's *t* test, and odds ratio (OR) were used to test the associations among different study variables. ROC (Receiver operating characteristic) curve, cutoff values, sensitivity, and specificity of all body composition parameters were calculated.

Ethical approval was obtained from the Institutional Ethical Committee and informed consent was obtained from participants. The study did not employ names or any other kind of identification; thus, the participants' private information was handled in confidence and kept to ourselves.

Results

The prevalence of low back pain was found to be 15.54% (46 out of total 296 women). The mean age of women was 43.11 ± 11.87 years. All the women with low back pain and 96.4% of women without low back pain were Hindus. Around 73.9% of women with low back pain and 58.7% of women without low back pain belonged to joint families. Most of the females were married in both groups (95.2% and 97.2%, respectively). Fifty-eight percent in the low back pain group belonged to the upper lower and below lower class. Fifty-two percent and 55.2% of the females were illiterate in group with low back pain and without low back pain, respectively.

There is a significant association between low back pain and age ($P = 0.015$), type of family ($P = 0.042$), and socioeconomic status ($P = 0.013$). There is no difference in both the groups with respect to other characteristics (age, religion, education, marital status) as depicted in Table 1.

There is no significant association between low back pain (in both the groups BMI ≥23 and BMI <23) and education, socioeconomic status, and physical activity [Table 2].

The risk of LBP is 7.24 times higher in BMI ≥23 than in women with BMI <23. Similarly, the risk of LBP is 3.67 times more in visceral fat % ≥10% than in women with visceral fat % <10% as depicted in Table 3.

The area under the ROC curve was calculated for BMI, VF, and BF. The area under the curve of BMI with LBP was 0.693 (0.598–0.788), VF with LBP was 0.647 (0.554–0.741), and BF with LBP was 0.520 (0.434–0.606) [Figure 1]. The area under the curve was statistically significantly higher for BMI.

Table 1: Characteristics of low back pain (LBP) among study subjects

Characteristics	LBP (*n*=46)		No LBP (*n*=250)		*P*
	n	%	*n*	%	
Age (in years)					
25–34	9	19.6	83	33.2	0.015
35–44	21	45.6	60	24	
45–54	8	17.4	68	27.2	
55–65	8	17.4	39	15.6	
Religion					
Hindu	46	100	241	96.4	0.928
Muslim	0	0	9	3.6	
Type of family					
Nuclear	12	26.1	105	41.6	0.042
Joint	34	73.9	145	58.4	
Marital status					
Married	44	95.7	243	97.2	0.527
Unmarried	0	0.0	2	0.8	
Widow	2	4.3	5	2	
Socioeconomic status of the family (Modified B.G. Prasad Classification)[14]					
Upper middle and above (I)	3	6.5	66	26.4	0.013
Lower middle class (III)	16	34.8	63	25.2	
Upper lower class and below (IV)	27	58.7	121	48.4	
Literacy status					
Illiterate	24	52.2	138	55.2	0.928
Primary school	11	23.9	55	22	
High school and above	11	23.9	57	22.8	

Furthermore, we found that the best cutoff of BMI for LBP was 23.35 [Table 4]. Specificity was also maximum for BMI, so BMI can be used as a better predictor of LBP.

Discussion

Lower back pain is a common problem among homemakers in our country. In the study, we described socio-demographics of study participants with LBP. The prevalence of LBP in our study was 15.54%, which was similar to a study conducted by Andersson[15] which estimated the annual worldwide LBP incidence in adults to be 15%. According to Papageorgiou *et al.*,[16] at least 50% of adults would have gone through an episode of LBP.

The homemakers who participated in our study were mainly in the middle age group and actively participated in household chores that require repeated bending, twisting movements, lifting, and pulling movements of the spine.[17] Koley *et al.* in their study found that manual handling and improper style of lifting objects put strain on the spine and can cause back problems.[18]

Nearly 60% of the people in India have significant back pain at some or other during their lives.[19] Knowledge of the incidence of musculoskeletal pain disorders and their burden is an important part of any country's health planning.[20] As age advances, women tend to gain weight, and an additional burden is placed on the lower back causing various types of disabilities including low back pain.[21] The highest odds were observed among homemakers who were overweight or obese (BMI ≥23).

According to certain studies, obesity is related to have lower back discomfort.[22] According to statistics, disk degenerative disorders and back discomfort have a substantial positive correlation with BMI.[23]

Obesity can cause osteoarthritis of the spine[24] and truncal adiposity causes spinal degeneration.[25] Studies have shown that increased BMI has been linked to impairment in people with persistent low back pain.[26] Additionally, studies have shown a favorable association between obesity, disk bulging, and low back discomfort. ($P < 0.05$).[27]

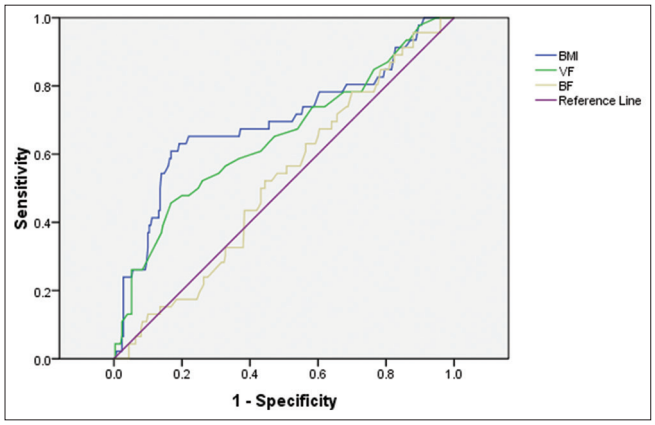

Figure 1: ROC curve of BMI, BF, and VF

Sreeja *et al.* noted that the majority of the disk-bulging females (76.2%) belonged to normal visceral fat.[28] The findings of the current study showed the association of LBP with obesity (BMI >23). These results are in line with a number of studies that evaluated the risk factors for LBP. Studies also identified age, sex, low income, and a lack of physical activity as risk factors.[29]

Table 2: Characteristics of subjects with BMI ≥23 and BMI <23 and LBP

Characteristics	LBP with BMI ≥23 (*n*=27)	LBP with BMI <23 (*n*=19)	*P*
Mean age	43.46±9.12	45.16±11.39	0.490
Education			
Illiterate	14	10	0.677
Primary school	8	3	
Above primary school	5	6	
Family			
Nuclear	9	3	0.321
Joint	18	16	
Socioeconomic status			
Upper middle and above (I)	3	0	0.385
Lower middle class (III)	11	5	
Upper lower class and below (IV)	13	14	
Dietary habit			
Vegetarian	20	15	0.975
Nonvegetarian	7	4	
Physical activity			
Sedentary	7	3	0.793
Standing	14	13	
Manual/strenuous/heavy manual	6	3	

*BMI=Body mass index

Table 3: Association of low back pain with weight-related measures

Weight-related measures	LBP present (*n*=46)	LBP absent (*n*=250)	95% CI	OR
BMI				
<23	19	209	Reference	
≥23	27	41	3.6858 to 14.2370	7.2439
Body fat				
≤30%	10	67	Reference	
>30%	36	183	0.6198 to 2.8027	1.32
Visceral fat				
<10%	24	200	Reference	
≥10%	22	50	1.9022 to 7.0680	3.67

Table 4: Area under the ROC curve and anthropometric cutoff point at maximum ROC area for prediction of LBP in women

Body composition parameters	ROC area	*P*	Cutoff point	Sensitivity	Specificity
BMI	0.693	0.000	23.35	58.7%	83.6%
VF	0.647	0.001	6.25	78.3%	26.8%
BF	0.520	0.667	35.45	47.8%	80%

*BMI=Body mass index, VF=Visceral fat, BF=Body fat, ROC=Receiver operating characteristic curve

The ROC analysis was done to study which is a better predictor of LBP. In the present study, it was observed that BMI was a better predictor for LBP. The AUC and specificity were highest for BMI as compared to VF and BF. The cutoff of BMI for LBP was 23.35; hence, we can conclude that obesity was associated with LBP.

The limitation of the study is that more anthropometric indices could be used to find the association with LBP. A larger sample of women needs to be studied for finding more predictors and risk factors of low back pain. The study can also be performed to include both genders which would widen the horizon of prediction of factors linked to LBP.

Conclusions

Women are backbone of families, especially in rural India. Low back pain is a major concern among women as physical activity causes strain in their spine and with an increase in weight, the problem of a low back increases further. Maintaining a BMI of less than 23.35 can help in reducing activity restriction due to pain. Various measures need to be explored to decrease the incidence and risk factors of LBP among women and enable them to lead a pain-free life.

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Conflicts of interest

There are no conflicts of interest.

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