

An Association of Body Composition Components with the Menopausal Status of Patients with Low Back Pain in Tarn Taran, Punjab, India

Shyamal Koley and Navtej Kaur Sandhu

*Department of Sports Medicine and Physiotherapy, Guru Nanak Dev University,
Amritsar 143 005, Punjab, India
Email: drkoley@yahoo.co.uk*

KEYWORDS Percent Body Fat. Pre- and Post-menopausal Women.

ABSTRACT The present study deals with the association of menopausal status of 146 patients (74 pre- and 72 post-menopausal women) with low back pain aged 35-55 years residing in and around Tarn Taran, Punjab, India, and their body composition components, viz. percent body fat and percent lean body mass. The results indicate strong association of percent body fat with all the ten pain measuring variables, viz. pain intensity ($r=0.668$), personal care ($r=0.519$), lifting ($r=0.620$), walking ($r=0.648$), sitting ($r=0.515$), standing ($r=0.471$), sleeping ($r=0.533$), sex life ($r=0.255$), social life ($r=0.664$) and travelling (0.583) in post-menopausal patients with low back pain.

INTRODUCTION

Low back pain is a major public health problem all over the world. Most people suffer incapacitating back pain at some stages in their lives. On any given day, an estimated 6.5 million people in the United States are bed-ridden because of back pain and approximately 1.5 million new cases of back pain are seen by physicians in each month. There has been growing concern about the low back disability in western society (Nachemson 1976). In India, occurrence of low back pain is also alarming; nearly 60 per cent of the people in India have significant back pain at some time or the other in lives (Suryapani 1996).

Epidemiological studies provide important information regarding various risk factors, viz. age and sex (Cunnigham and Kelsey 1984; Leino et al. 1994; Hurwitz and Morgenstern 1997), occupation (Kelsey 1982; Bongers et al. 1988; Battie et al. 1990; Piazzini et al. 1991; Piccinni et al. 1992; Rothenbacher et al. 1997; Nubling et al. 1997), life style and socio-economic status (Kendall et al. 1983; Leino et al. 1994; Hurwitz and Morgenstern 1997), smoking habit (Frymoyer et al. 1983; Beiring-Sorensen and Hilden 1984; Deyo and Bass 1989) and menopausal status (Tchernof et al. 1998; Toth et al. 2000).

Menopause is associated to the increase in fat mass and a decrease in lean mass exceeding age-related changes, possibly related to reduced output of ovarian steroids (Sorensen et al. 2001; Loshak 2002). Several studies have reported that

the prevalence of low back pain increases in middle aged women (Adera et al. 1994; Lau et al. 1995; Yip et al. 2001). As women age they tend to be overweight and an additional burden is placed on the lower back causing various types of disabilities including low back pain. Keeping those complications in mind, in the present study an attempt has been made to investigate the association of percent body fat with height, weight and BMI in pre and post-menopausal patients with low back pain residing in and around Tarn Taran, Punjab, India.

MATERIALS AND METHIODES

A total of 146 purposively selected low back pain patients (74 pre-menopausal and 72 post-menopausal women) aged 35 - 55 years were considered as sample taken from in and around Tarn Taran, Punjab, India. The study was conducted during August, 2008 to January, 2009. All the patients were ambulatory and were judged to be significantly intelligent to understand the instructions of the experiment. The patients were further divided into two groups, viz. pre-menopausal women aged 35-45 years and post-menopausal women aged 46-55 years. The study was approved by the local ethics committee.

Three anthropometric variables, viz. height, weight, BMI and two body composition components, viz. percent body fat and percent lean body mass, were measured on all the subjects. The height was recorded to the nearest

0.1 cm, and weight was measured to the nearest 0.1 kg. after Weiner and Lourie (1969). BMI was calculated as weight (kg)/ height² (m²). Percent body fat was calculated after Womersley and Durnin (1977), with the formula: Women (17-68 years) Percent fat = 1.37 X BMI – 3.47; Men (17-68 years) Percent fat = 1.34 X BMI -12.47. Percent lean body mass was calculated as 100- percent body fat. Severity of disability in patients was estimated by Oswestry Low Back Pain Disability Questionnaire (Fairbank and Davies 1980).

Data were analyzed using SPSS (Statistical Package for Social Science) version 7.5. Student's t test was applied for the comparison of all the variables between pre and post menopausal patients with low back pain. Pearson's correlation coefficients were also analyzed. A 5% level of probability was used to indicate statistical significance.

RESULTS AND DISCUSSION

Table 1 shows the severity of disability in pre and post menopausal women with low back pain applying modifying ODQ. In pre-menopausal women, the maximum percentage of disability (91.89%) were found in the category of minimal (0%-20% disability), followed by moderate (21%-40% disability) (6.75%) and severe (41%-60% disability) (1.35%). In post-menopausal women,

the maximum frequency (40.27%) was reported in severe category, followed by crippled category (61%-80% disability) (38.88%), moderate category (18.05%) and minimal category (2.77%).

The distribution of mean values and standard deviations of ten pain measuring variables in pre and post-menopausal patients with low back pain is given in Table 2. Post-menopausal women have the higher mean values in all the ten variables than their pre menopausal counterparts, showing highly significant differences ($P < 0.001$) in pain intensity ($t=15.41$), personal care ($t=13.24$), lifting ($t=17.92$), walking ($t=19.48$), sitting ($t=14.98$), standing ($t=19.87$), sleeping ($t=18.31$), sex life ($t=5.62$), social life ($t=14.52$) and in travelling ($t=15.15$).

Table 3 shows the distribution of mean values and standard deviations of five variables in pre and post-menopausal patients with low back pain. The post menopausal women have the higher mean values in weight (81.33 kg), BMI (34.38 kg/m²) and percent body fat (43.62%) and lesser mean values in height (153.67cm) and percent lean body mass (56.39%) than the pre-menopausal women (66.30kg, 27.81 kg/m², 34.67%, 154.32cm and 65.25% respectively). However, highly significant differences ($p < 0.001$) were noted in weight ($t=9.88$), BMI ($t=11.15$), percent body fat ($t=11.08$) and percent lean body mass ($t=11.12$) between the pre- and post-menopausal patients with low back pain.

Table 1: Severity of disability in pre- and post-menopausal patients with low back pain

Status	N	Minimal (0%-20% disability)		Moderate (21%-40% disability)		Severe (41%-60% disability)		Crippled (61%-80% disability)		Bed-ridden (81%-100% disability)	
		Abs. no.	%age	Abs. no.	%age	Abs. no.	%age	Abs. no.	%age	Abs. no.	%age
Pre-menopausal	74	68	91.89	5	6.75	1	1.35	-	-	-	-
Post-menopausal	72	2	2.77	13	18.05	29	40.27	28	38.88	-	-

Table 2: Distribution of mean values and standard deviations of ten pain measuring variables in pre- and post-menopausal patients with low back pain

Variables	Pre-menopausal women (n=74)		Post-menopausal women (n=72)		t value
	Mean	S.D.	Mean	S.D.	
Pain intensity	1.04	0.82	3.08	0.78	15.41*
Personal care	0.70	0.57	2.54	1.05	13.24*
Lifting	0.88	0.49	3.07	0.92	17.92*
Walking	0.34	0.56	2.92	0.99	19.48*
Sitting	1.04	0.82	2.92	0.69	14.98*
Standing	0.68	0.62	2.97	0.77	19.87*
Sleeping	0.12	0.40	2.54	1.06	18.31*
Sex life	0.78	0.56	1.87	1.57	5.62*
Social life	0.86	0.45	2.80	1.06	14.52*
Travelling	0.89	0.42	2.69	0.93	15.15*

*indicates $P < 0.001$

Table 3: Distribution of mean values and standard deviations of five variables in pre- and post-menopausal patients with low back pain

Variables	Pre-menopausal women (n=74)		Post-menopausal women (n=72)		t value
	Mean	S.D.	Mean	S.D.	
Height	154.32	3.97	153.67	4.22	0.97
Weight	66.30	8.19	81.33	10.12	9.88*
BMI	27.81	3.18	34.38	3.91	11.15*
Percent body fat	34.67	4.34	43.62	5.38	11.08*
Percent lean body mass	65.25	4.21	56.39	5.37	11.12*

* indicates $P < 0.001$

The correlation coefficient of percent body fat with other ten variables in pre- and post-menopausal patients with low back pain is presented in Table 4. In pre-menopausal women, percent body fat has positively significant correlations only with lifting ($r=0.240$), but in post-menopausal women percent body fat has significantly positive correlations with all the ten variables, viz. with pain intensity ($r=0.668$), personal care ($r=0.519$), lifting ($r=0.620$), walking ($r=0.648$), sitting ($r=0.515$), standing ($r=0.471$), sleeping ($r=0.533$), sex life ($r=0.255$), social life ($r=0.664$) and travelling ($r=0.583$).

The menopause transition is associated with deleterious changes in body composition and body fat distribution. It is associated with reduced lean body mass and increased fat mass due to ageing and declining ovarian hormone secretion (Sorensen et al. 2001; Loshak 2002). Among the numerous causes of low back pain, obesity related to menopause is one which affects the social life too. The findings of the present study indicate that post-menopausal patients with low back pain have the maximum frequency (40.27%) in severe category (41%-60% disability) depending upon their severity of pain (Table 1). They have higher mean values for all the ten pain

measuring variables (Table 2), higher mean values for weight, BMI and percent body fat (Table 3) and have significantly positive correlations with percent body fat and all the pain measuring measurements (Table 4). Guo et al. (2008) reported that BMI exceeding 24 kg/m^2 or waist to hip ratio exceeding 0.85 might cause overweight, obesity or central obesity. The foundation of the increasing lumbar lordosis and sacrum slant angle might be the one of reasons of low back pain in elderly obese. In the present study, the mean values for BMI were 27.81 kg/m^2 in pre-menopausal and 34.38 kg/m^2 in post-menopausal women with low back pain, following the same direction of Guo et al. (2008).

Adera et al. (1994), Lau et al. (1995) and Yip et al. (2001) reported that with the increment of age, women did tend to be overweight and an additional burden was placed on the lower back, causing various types of disabilities including low back pain. The findings of the present study followed the same direction. During the post-menopausal period, the production of estrogen and progesterone diminish and become more irregular, bone mineral density decreases causing more prone to osteoporosis. Toth et al. (2000) reported that post-menopausal status was associated with a preferential increase in intra abdominal fat that was independent of age and total body fat mass. Tchernof et al. (1998) studied the effect of menopause transition on body fatness and body fat distribution and found that the menopause transition was related to modest increase in body mass index or total fatness, increased central adiposity appeared to be related to menopause, independent of advancing age. Thus, post-menopausal patients with low back pain need to take special care to their backs in day to day activities.

REFERENCES

Adera T, Deyo RA, Donatelle RJ 1994. Premature

Table 4: Correlation coefficients (r) of percent body fat with other 10 variables in pre- and post-menopausal women.

Variables	Pre-menopausal women (n=74)	Post-menopausal women (n=72)
Pain intensity	0.082	0.668**
Personal care	0.221	0.519**
Lifting	0.240*	0.620**
Walking	0.147	0.648**
Sitting	0.092	0.515**
Standing	0.227	0.471**
Sleeping	0.216	0.533**
Sex life	-0.038	0.255*
Social life	0.228	0.664**
Travelling	-0.061	0.583**

*indicates $P < 0.05$; ** indicates $P < 0.01$

- menopause and low back pain: A population based study. *Ann Epidemiol*, 4: 416-422.
- Battie MC, Biggo SJ, Fisher LD, Spengler DM, Hansson TH et al. 1990. Anthropometric and clinical measures as predictors of back pain complaints in industry: A prospective study. *J Spinal Disord*, 3: 195-204.
- Biering – Sorensen F, Hilden J 1984. Reproducibility of the history of low back trouble. *Spine*, 9: 280-286.
- Bongers PM, Boshuizen HC, Hulshof CT, Koemeester AP 1988. Back disorders in crane operators exposed to whole body vibration. *Int Arch Occup Environ Health*, 60: 129-137.
- Connighan, LS, Kelsey JL 1984. Epidemiology of musculoskeletal impairments and associated disability. *Am J Public Health*, 74: 574-579.
- Deyo RA, Bass JE 1989. Life Style and low back pain the influence of smoking and obesity. *Spine*, 14: 501-506.
- Fairbank JCT, Davies JB 1980. The Oswestry low back pain disability questionnaire. *Physiotherapy*, 66: 271-273.
- Frymoyer JW, Pope MH, Elements JH 1983. Risk factors in low back pain. An Epidemiological Survey. *J Bone Joint Surg Am*, 65: 213-217.
- Guo JM, Zhang GO, Alimujiana 2008. Effect of BMI and WHR on lumbar lordosis and sacrum slant angle in middle and elderly women. *Zhongguo Gu Shang*, 21: 30-31.
- Hurwitz EL, Morgenstern H 1997. Correlates of back related disability in the U.S. *J Clin Epidemiol*, 50: 669-681.
- Kelsey, JL. 1982. Idiopathic Low Back Pain, Magnitude of the problem. In: AA White III, SL Gardon (Eds): *Symposium on Idiopathic Low Back Pain*. Lampa, Florida, U.S.A. St. Louis: Mosby, Yearbook, Cover Publishing Co., pp 23-38.
- Kendall FP, Mc Greary EK, Provance PG 1983. *Muscle Testing and Function*. Baltimore: Williams and Wilkins, pp. 349-360.
- Lau EMC, Egger P, Coggon D, Cooper C, Valenti L et al. 1995. Low back pain in Hong Kong: Prevalence and characteristics compared with British. *J Epidemiol Community Health*, 49: 492-494.
- Leino PI, Berg MA, Puska P 1994. Is back pain increasing? Results from national surveys in Finland during 1989-1992. *Scand J Rheumatol*, 23: 296-306.
- Loshak VD 2002. Oestrogen-Androgen replacement significantly benefits post-menopausal women. *J Clin Endocrinol Metab*, 87: 1509-1516.
- Nachemson A 1976. The lumbar spine: An orthopedic challenge. *Spine*, 1: 9-21.
- Nubling M, Michaelis M, Hofmann F, Stossel S 1997. Spinal diseases in the nursing profession –A cross sectional study. *Gesundheitswesen*, 59: 271-274.
- Piazzini A, Bollino G, Mattioli S 1991. Spinal pathology in self employed truck drivers. *Med Lav*, 82: 122-130.
- Piccinni S, Marchi T, Lorusso A, Margorotto G 1992. The prevalence of spondylopathies among crane operators in the port of Venice. *Med Lav*, 83: 146-149.
- Rothenbacher D, Brenner H, Arndt V, Fraisse E, Zschenderlein B et al. 1997. Disorders of the back and spine in construction workers: Prevalence and prognostic value of disability. *Spine*, 22: 1481-1486.
- Sorensen MB, Rosenfalck AM, Hojgaard L, Ottesen B 2001. Obesity and Sarcopenia after menopause are reversed by sex hormone replacement therapy. *Obes Res*, 9: 622-625.
- Suryapani R. 1996. Backache borne of modern lifestyle. *The Tribune*. 6 Nov. P. 16.
- Tchernof A, Poehlman GT 1998. Effects of the menopause transition on body fatness and body fat distribution. *Obes Res*, 6: 246-254.
- Toth MJ, Chernof AT, Sites CK, Poehlman ET 2000. Effect of menopausal status on body composition and abdominal fat distribution. *Int J Obesity*, 24: 226-231.
- Weiner JS, Lourie JA 1969. *Human Biology: A Guide to Field Methods*. Oxford: Blackwell Scientific Publications.
- Womersley J, Durnin JVGA 1977. A comparison of the skinfold method with extent of 'over weight' and various weight height relationships in the assessment of obesity. *Br J Nutr*, 38: 271-284.
- Yip YB, Ho-Suzanne C, Chan SG 2001. Tall stature, overweight and the prevalence of low back pain in Chinese middle aged women. *Int J Obes Related Metab Dis*, 25: 887-892.