PRINT: ISSN 0972-0073 ONLINE: ISSN 2456-6802
Anthropologist, 13(2): 117-120 (2011)
DOI: 10.31901/24566802.2011/13.02.08

No Relationship between Low Back Pain and Hamstring Flexibility

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KEYWORDS Disability. Severity. Low Back Pain

ABSTRACT The present study deals with the relationship of hamstring flexibility with low back pain in patients of Ludhiana, Punjab, India (n = 102; 26 males and 76 females) aged 30- 55 years. The modified Oswestry Pain Questionnaire was used to assess the severity of low back pain in patients. To assess the hamstring flexibility, active knee extension of both the sides was measured by goniometer. The findings of the present study did not show a significant correlation between low back pain and hamstring flexibility.

INTRODUCTION

Low back pain is a major public health problem all over the world. Most people suffer incapacitating back pain at some stage 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 of low back pain, viz. age and sex (Cunnigham and Kelsey 1984; Leino et al. 1994; Hurwitz and Morgensterm 1997; Sharma et al. 2002), body composition (Koley and Sandhu 2009; Koley and Sharma 2009; Koley et al. 2010b), occupation (Kelsey 1982; Bongers et al. 1988; Battie et al. 1990; Piazzi et al. 1991; Piccinni et al. 1992; Limburska et al. 1996; Rothenbacher et al. 1997; Nubling et al. 1997; Koley et al. 2010a), lifestyle and socio-economic status (Hurwitz and Morgenstern 1997; Leino et al. 1994; Kendall 1983), smoking habit (Frymoyer et al. 1983; Beiring-Sorensen and Hilden 1984; Heliovaara 1998; Deyo and Bass 1989).

The present study investigated the relationship between hamstring flexibility and low back pain. The notion among the orthopaedicians and physical therapists is that tight hamstring may effect the occurrence of low back pain. The present study was planned to verify the notion.

MATERIAL AND METHODS

A total of 102 purposely selected low back pain patients (26 males and 76 females) aged 30 - 55 years were considered as sample from various Physiotherapy Centers of Ludhiana, Punjab, India. All the patients were ambulatory and were judged to be adequately intelligent to understand the instructions of the experiment. The data were collected under natural environmental conditions in the mornings (between 8 AM. to 12 noon). The study was approved by the local ethics committee.

The Oswestry low back pain Disability Questionnaire (ODQ) was developed as a self-administered questionnaire (Fairbank et al. 1980) to measure the disability. In this modified ODQ, nine sections, viz. pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life and traveling were applied for the evaluation of the severity of disability. Each section contained six questions using a Likert scale of 0 through 5, indicating the level of pain intensity, 0 being no pain and 5 being the greatest pain. A written consent was obtained from the subjects. The study was approved by the local ethical committee,

Hamstring Flexibility Test

Hamstring flexibility was measured using active knee extension test with goniometer. The subject was asked to lie down in supine position

on the table with the legs extended and hands kept side by side. The testing leg was flexed at the hip to 90° angles actively. Initially the knee also was flexed at 90°, then active knee extension was done for the extension of hamstring muscles. Subjects were able to take all the necessary instructions in testing the muscles.

Statistical Analysis

Standard descriptive statistics (mean ± standard deviation) were determined for directly measured and derived variables. Unpaired t-test was applied for comparisons of sex differences for pain measuring variables. Pearson's correlation coefficients were applied to establish the relationships among the variables measured. Data were analyzed using SPSS (Statistical Package for Social Science) version 17.0. A 5% level of probability was used to indicate statistical significance.

RESULTS AND DISCUSSION

Table 1 shows the sex-wise distribution of severity of low back pain in male and female patients applying modifying ODQ. Both in males and females, the maximum percentage of disability were found in the category of minimal (58.33% and 47.37 % respectively), followed by moderate (33.33 % and 36.84% respectively), severe (4.17 % and 13.16 % respectively) and in the crippled (4.17 % and 2.63 % respectively). There was no case of bed-ridden category reported.

The distribution of mean values and standard deviations of nine pain measuring variables patients with low back pain is given in Table 2. Female patients have the higher mean values in all the nine variables, except lifting and social life, showing statistically no significant differences in any case.

Table 3 shows the correlation coefficient of disability percent with other variables in patients with low back pain. Both in males and females, disability percent have statistically significant correlations with pain intensity, pain care, lifting, walking, sitting, standing, sleeping (only in females), social life, and travelling. Knee extension of both right and left legs had negative correlations with low back pain and disability percent, these correlations were statistically not significant.

Hamstring, located at the back of thigh, is a group of three muscles, namely the semi-membranous, semi-tendinous and biceps femoris. These muscles get attachment to the lower part of the pelvis and the lower leg bones below the knee joint. Due to lack of adequate physical activity, muscle weakness, some degenerative factors, viz. osteoarthritis, senile osteoporosis, and degenerative disc diseases etc., low back pain occurs in elderly people. It is also predicted that prolong tight hamstring muscles cause back pain.

Table 1: Sex-wise distribution of disability in patients with low back pain

Sex	*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*
Males	26	14	58.33	08	33.33	01	4.17	01	4.17	0	-
Females	76	36	47.37	28	36.84	10	13.16	02	2.63	0	-

Table 2: Descriptive statistics of nine pain measuring variables in patients with low back pain

Variables	*Females*		*Males*		*t-value*
	Mean	*S.D.*	*Mean*	*S.D.*	
Pain intensity	1.29	1.14	1.26	1.10	0.106
Pain care	0.97	1.06	0.91	1.24	0.231
Lifting	1.42	1.18	1.78	1.44	-1.220
Walking	1.38	1.20	0.91	1.04	1.689
Sitting	1.88	1.36	1.39	1.23	1.550
Standing	1.84	1.35	1.48	1.24	1.155
Sleeping	0.50	0.89	0.48	0.73	0.107
Social life	0.59	0.87	0.74	1.01	-0.685
Travelling	1.57	1.17	1.17	0.98	1.457

Table 3: Pearson correlation coefficients of disability percent with other variables in patients with low back pain

Variable	*Female*		*Males*	
	r	*p*	*r*	*p*
Pain intensity	0.644	.000	.646	.001
Pain care	0.701	.000	.865	.000
Lifting	0.638	.000	.694	.000
Walking	0.647	.000	.633	.001
Sitting	0.621	.000	.765	.000
Standing	0.693	.000	.651	.001
Sleeping	0.478	.000	.356	.095
Social life	0.755	.000	.823	.000
Travelling	0.666	.000	.814	.000
Knee ext.rt	-0.158	.173	-.175	.423
Knee ext.lt	-0.070	.549	-.136	.536

Stutchfield and Coleman (2006) found no association between low back pain and hamstring flexibility while studying the university male rowers. Our findings also followed the same line showing non-significant negative correlations with hamstring flexibility and low back pain. As it was reported that hamstring flexibility was strongly correlated with pelvic rotation and forward bending range (Bellew et al. 2010), it might not affect the complications on lumbar, causing non-significant negative correlations between hamstring flexibility and low back pain. Decreased flexibility was observed in limited rotation. Assessment of subjects at risk of developing low back pain should include analysis of hamstring flexibility and forward bending motion.

Apart from other medical problems, pregnancy and child bearing aggravate the complications in females. Special care is needed for the spine with increasing ages. It appears that manual handling and improper style of lifting objects equally harm the spine due to abnormal stress and strain imposed on spine during the activities. Low back pain affects people from all the strata of the society. Most of the low income group people in our country are engaged in physically demanding jobs. Sharma et al. (2002) reported the maximum frequency (50.00%) of low back pain in people involved in jobs requiring handling of heavy loads, followed by people with sitting jobs (19.09%), standing jobs (16.36%) and with prolonged squatting (14.54%) from this northern parts of India. During lifting, spine bends only approximately 45 degree of forward flexion, the remainder of the range occurs at the pelvis. So, while straightening up the spine during lifting up the objects, the pelvis must de-rotate first with the spine remaining flexed. In upper income group also, lack of physical activity leads to obesity and association of obesity with low back pain is apparently reported by Leino et al. (1994) and Hurwitz and Morgenstern (1997). Accumulation of more weight around abdomen results in hyperlordosis of lumbar spine in order to maintain the erect posture and weight line shifts posteriorly and pass through the facet joints. Again, there is stretching of anterior longitudinal ligament, approaching of pedicles, facet joints near to each other, compression of nerve roots and ultimately occurrence of pain at low back. Though the findings of the present study did not show any association of hamstring flexibility and low back pain, still adequate physical activity would provide healthy hamstring muscles functioning for the improvement of pelvic rotation and forward bending range.

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