Original Article

The prevalence and correlates of low back pain in adults: A cross sectional study from Southern India

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Abstract

Low back pain is a major public health problem all over the world. It is generally assumed that overweight, height and low back pain are related. However, the scientific evidence to support this relationship is not fully conclusive. The aim of this study is to estimate the prevalence of low back pain and its association with height, fat distribution, reproductive history and socioeconomic influence. A representative sample of 401 men and 403 women aged 20 years and above were selected and studied. It is found that 28.4% and 52.9% respectively were having low back pain. Height and fat distribution were found to have no association with low back pain. Both men and women, whose household were in the lower socio economic status reported more back pain (Adjusted odds ratio (AOR) for men 1.61, 95% confidence interval (CI): 1.02, 2.55 and AOR for women 1.57, 95% CI: 1.02, 2.34). Men with lower educational qualification reported more back pain (AOR 1.89, 95% CI: 1.08, 3.31). In women, those who have undergone caesarean section (AOR 1.661, 95% CI: 1.02, 2.72) and sterilization (AOR 1.63, 95% CI: 1.09, 2.44) were found to be a positively associated with low back pain. The only socioeconomic link with back pain among women seemed to be manual occupation (AOR 3.33, 95% CI: 1.49, 7.4). The finding confirms the higher burden of back pain on the socially disadvantaged, but cannot yet be explained by known risk factors.

Key words: Fat distribution, height, low back pain, reproductive history, socioeconomic class

INTRODUCTION

Low back pain is an emerging public health problem all over the world. It is generally assumed that overweight and low back pain are related[1]. However, scientific evidence to support this relationship is not fully conclusive.[2,3,4] Some studies have reported that subjects who carry excessive abdominal fat mass over a long period may be at risk of low back pain, as a result of altered posture to counter balance the protruding fat mass.[5] It is also observed that height may relate independently to low back pain from large abdominal fat mass and may aggravate back pain associated with stooping especially in those with large waist or large abdominal fat mass.[5] These people may require more reactive forces to counteract the gravitational pull on this fat mass to achieve balance, especially when bending forward for lifting or when walking downstairs. As a result, more strain may be exerted on their lower back. Some studies have proved that those with central fat distribution, indicated by high waist to hip ratio, which may be at increased risk of low back pain independently from total fatness, measured by body mass index. However, other evidence of low back pain and height is conflicting. Studies were reported that there was no association between height and low back pain even after age and lifestyle adjustments.[5,6] But, Heliovaara, 1987 reported that men above 180 cm and women above 170 cm had 2 and 4 times risk of herniated lumber intervertebral disc compared to those who were 10 cm shorter.[7] On the other hand Kelsey 1975 found no association between height and low back pain.[8]

In addition, many studies have reported a stronger association between social class and the consequences of back pain.[9] Social class differences in the occurrence of non-fatal conditions, such as back pain, could also provide clues to etiology, but data about these are more limited. Certain occupational factors that have been associated with back pain among low socio economic status include the manual

lifting of heavyweights.[10] There is some evidence linking backache with behaviors that differ across social groupings such as cigarette smoking[11] and stress and psychiatric morbidity.[12] Although the evidence relating to such risks is far from consistent,[8] it provides the basis for interpreting socio-economic differences in back pain occurrence. However, these earlier studies on the association of low back pain and socio-economic influences among women have not considered type of delivery, sterilization and other reproductive history which may confound the results.

In India, nearly 60 percent of the people have significant back pain at some time or the other in their life.[13] However, most of the earlier studies in India were hospital based and rarely the population based studies were done on the association of low back pain with socioeconomic class and other anthropometric measures. The present study, is aimed at finding the prevalence of low back pain and to examine its association with height, fat distribution, reproductive history and socio-economic influences.

MATERIALS AND METHODS

Sample size estimation and sampling methods

Assuming the prevalence of low back pain as 60% with an allowable error of 5%, the minimum sample size required for this study was calculated to be 800. The sample was selected in two stages. The study was conducted in the non-slum areas of the field practice area of the Urban Health Centre of PSG Institute of Medical Sciences and Research, Coimbatore.The primary sampling unit (PSU) was selected randomly from the list of such areas. In the second stage, the households were selected using simple random sampling within each selected PSU. According to the National Family Health Survey data of India, about 56% of the population belongs to the age group of 20 years and above.[14] Based on these values, the expected number of subjects was estimated to be 14384, in 4348 households. In order to get 800 subjects, 300 households were required to be selected. Using random numbers, four non-slum areas from 12 non-slum areas were selected. The required number of households were selected proportionately from the four non-slum areas to make the design self weighting. Of the 300 households selected, seven houses were found locked, even after the third visit. In such a case, as replacement, neighboring houses were selected. Thus, a total of 804 subjects were interviewed from 307 households. The Institutional Human Ethics committee of the institution approved all subject recruitments and data collection procedures. The data collection was done from June 20 to July 20, 2011.

Data collection methods

A brief questionnaire was used to screen, among the respondents, the occurrence of low back pain in the past year. The questions included occurrence of low back pain, demographic factors and reproductive health history. Low back pain was identified among subjects who have back pain lasting for more than a day in an area between the lower costal margin and the gluteal folds with or without radiation into leg to below the knees during the past one year[5]. Episodic and persistent types of pains were included. However; pregnant women were excluded and subjects who were not able to communicate because of dialect or hearing problems were also excluded.

The anthropometric measurements included measures of body height (cm) and weight (kg) using standard measurement equipments, which were performed in an empty room with the subjects wearing light indoor clothing and no shoes. Few investigators were trained in taking anthropometric measurements and performed in each day. Standing height was measured using non stretchable tape suspended from the wall and was measured to the nearest 0.1 cm.Weight (kg) was measured to the nearest 0.5 Kg.Waist and Hip circumference (cm) were assessed using a measuring tape while the subject was standing. Other factors examined were occupation, education and smoking. In women current menstrual status, multi-parity, type of delivery, sterilization and use of oral contraceptives were also examined. These factors were widely considered to be important determinants of risk for low back pain.[15-19] Socio-demographic background included age (in years), highest education level attained (upto higher secondary *vs* University level education), Occupation (Manual laborers *vs.* Non-manual laborers), number of family members and monthly income. Age was self reported and defined as the age at time of examination. Women were asked about multi-parity (<2 *vs* ≥2), type of delivery (Caesarean *vs* others), current menstruation (No *vs* Yes), Sterilization (No *vs* Yes), and also the use of oral contraceptives (No *vs* Yes).

Statistical analysis

The Socio Economic Status (SES) was measured based on Prasad's modified classification. This was based on consumer price index (Industrial workers) (CPI (IW)) for the month of May 2011 after rounding off to the nearest Rs. 10. Those with per capita monthly Income of Rs. 4270 and above were classified as class I.[20] Body Mass Index (BMI) was computed for male and female using the formula weight (kg)/ height (m^2). Subjects were classified as overweight if their BMI was equal to or greater than 25 Kg/m^2. The waist circumference was divided into two groups: <80 cm and ≥80 cm for women and <90 cm and ≥90 cm for men [21]. The ratio of waist to hip circumference was calculated and the data was divided into two groups: <0.8 and ≥0.8 for women and <1.00 and ≥ 1.00 for men. [21] Analysis was done for men and women separately. Continuous variables, such as height and weight were divided into percentiles. The prevalence of low back pain in various age groups of 10 year width was analyzed using descriptive statistics (mean and median for continuous variables and percentages for categorical variables). Z-test was used to compare the prevalence in men and women. The relationship between the prevalence of low back pain and anthropometric parameters was evaluated with logistic regression (unadjusted odds ratio and 95% CI). For analyzing the association of reproductive history with low back pain, age adjusted odds ratio and 95% CI were reported. Sequential logistic regression model, were used to assess the association between the socioeconomic influences and low back pain controlling other risk factors. All the

analysis was done using the Statistical package for social sciences (SPSS), version 11.5

RESULTS

Among 401 men studied, 28.4% were having low back pain and among 403 women studied, 52.9% were having low back pain. Table 1 highlights that the prevalence of low back pain (LBP) was highest (50%) in the age group (41-50 years) compared to other age groups. In younger age group. (20-30 years) the prevalence was found to be 30.8%. In general the prevalence of LBP was higher in women (52.9%) compared to men (28.4%) and the difference was statistically significant ($P < 0.001$).

Table 1: Prevalence of self reported Low Back Pain (LBP) in the study population

Age (years)	Men		Women		Total	
	Number studied	% with LBP	Number studied	% with LBP	Number studied	% with LBP
20-30	101	15.8	100	46	201	30.8
31-40	98	25.5	126	51.6	224	40.2
41-50	69	40.6	81	58	150	50
51-60	71	32.4	55	52.7	126	41.3
61 and above	62	19.3	41	12.2	103	46.6
All age group	401	28.4	403	52.9	804	40.7

The median height was 165 cm for men and 153 cm for women respectively. The median weight was 64 Kg for men and 60 Kg for women respectively. Tall stature (for men OR = 0.84; for women OR = 0.72), waist circumference (for men OR = 1.26; for women OR = 1.07), waist hip ratio (for men OR = 1.91; for women OR = 0.85), and Body Mass Index (for men OR = 1.31; for women OR = 1.11) were found to have no association ($P > 0.05$) with low back pain in both men and women. This has been illustrated in Table 2. Also smoking in men had no significant relationship with low back pain. All the women studied were non-smokers.

Table 3 shows the association of low back pain with reproductive history. Women who have undergone Caesarean section were found to have a positive association with low back pain (adjusted odds ratio 1.661, 95% CI: 1.02, 2.72). Also sterilization was found to be a risk factor of low back pain (adjusted odds ratio 1.63, 95% CI: 1.09, 2.44). Parity, post-menstruation and use of oral contraceptives had no significant relationship with low back pain. Table 4 shows that both men and women whose households were in the lower socio economic status reported more back pain than those in the higher socio-economic status (adjusted odds ratio for men 1.61, 95% CI: 1.021, 2.55 and adjusted odds ratio for women 1.57, 95% CI: 1.02, 2.34). These associations were not explained by smoking and obesity. Men with lower educational qualification reported more back pain than those with university and higher education qualification (Adjusted odds ratio 1.89, 95%

Table 2: Association of self- reported Low Back Pain with anthropometric measures and smoking

	Men				Women			
	No. studied	% with LBP	Odds ratio	95% CI	No. studied	% with LBP	Odds ratio	95% CI
Smokers								
Non smoker	212	27.8	1		403	52.9	1	
Ex-smoker	51	33.3	1.015	0.63, 1.64	—	—	—	—
Current smoker	138	27.5	0.985	0.61, 1.59	—	—	—	—
Ex/current smoker	189	29.1	1.064	0.69, 1.64	—	—	—	—
Body mass index								
Normal (<25 kg/m[2])	261	26.4	1		185	51.4	1	
Overweight (≥25 kg/m[2])	140	32.1	1.318	0.84, 2.07	218	54.1	1.118	0.75, 1.65
Height								
Below median (165 cm for men and 153 cm for women)	217	30.0	1		223	56.5	1	
Above median (165 cm for men and 153 cm for women)	184	26.6	0.849	0.548, 1.314	180	48.3	0.72	0.485, 1.068
Weight								
Below median (64 kg for men and 60 kg for women)	216	26.4	1		208	54.3	1	
Above median (64kg for men and 60 kg for women)	185	30.8	1.24	0.80, 1.91	195	51.3	0.86	0.60, 1.31
Waist Circumference								
Normal (<90 cm for men and <80 cm for women)	298	27.2	1		189	51.9	1	
Above normal (≥90 cm for men and ≥80 cm for women)	103	32.0	1.263	0.78, 2.05	214	53.7	1.079	0.73, 1.60
Waist-hip ratio								
Normal (<1.00 for men and < 0.80 for women)	360	28.1	1		115	55.7	1	
Above normal (≥1.00 for men and ≥ 0.80 for women)	41	31.7	1.91	0.59, 2.39	288	51.7	0.854	0.55, 1.32

CI: 1.08, 3.31). Similar association was not observed among women. In women, the only socio-economic link with back pain seemed to be manual occupation (Adjusted odds ratio 3.33, 95% CI: 1.49, 7.40).

DISCUSSION

This study, conducted in the urban field practice area of PSG Institute of Medical Sciences and Research, Coimbatore, provided the data on the prevalence of self reported low back pain. This study showed a high prevalence of low back pain (40.7%) in subjects aged 20 years and above. The prevalence was significantly higher among women (52.9%) compared with men (28.4%) and the difference was statistically significant ($P < 0.001$). In other words, one out of the three people in the field practice area had at least one day low back pain in the past one year. With such prevalence there is a high demand for health education and service provision focused on these populations. A recent study among Danish twins reported similar high prevalence of LBP.[22] In another study found that LBP at age 18 significantly increased the risk of LBP at age 30.[23] This present study showed a prevalence of 30.8% in the age group (20-30years). This indicates that it is important to learn more about this condition in the younger age in order to implement primary preventive measures at an early age.

Table 3: Association of self reported Low Back Pain and reproductive history in women

	No. Studied	% with LBP	Odds Ratio	95% CI
Parity				
<2	312	49.4	1	
≥2	91	64.8	1.632	0.95, 2.79
Type of delivery				
Others	312	51	1	
Caesarean	91	59.3	1.661**	1.02, 2.72
Menstruation				
Yes	266	51.1	1	
No	137	56.2	0.687	0.36, 1.30
Sterilization				
No	229	47.2	1	
Yes	174	60.3	1.631**	1.09,2.44
Oral contraceptives				
No	393	52.4	1	
Yes	10	70.0	2.424	0.61, 9.57

*Adjusted for age. **$p < 0.05$

In this study, no association was found between height and low back pain. There are several studies that conform to the pattern that height is not correlated with the occurrence of low back pain in women, though in men many studies reported a positive correlation[15,17,18]. This study has also examined the association between low back pain and weight. The results conform to the pattern wherein weight does not correlate with the occurrence of low back pain and is consistent with previous studies.[24] These findings provide no evidence that a greater body mass index and waist-hip ratio is associated with an increased risk of low back pain. These results support the findings of YP Yip[24] and contrast with findings of Han *et al.*,[5]

In this study, women who have undergone caesarean section or sterilization reported more low back pain than who have not undergone these procedures. This may be due to the sedentary life style after the caesarean section. Nevertheless, it was also observed that women who have occupation described as "Physically demanding" also have higher risk of low back pain suggesting that extremes of activity are probably not ideal.

In this study, socio-economic status was inversely associated with low back pain in men. The rationale for examining socio economic influences on common symptoms is that any differences in social group may be the effect of preventable environment or lifestyle risks. For example, measures of social class based on income may reflect alcoholism, smoking habits, obesity or occupations which have an effect on back pain.[9] A number of epidemiological studies have reported a link between smoking and back pain which shows a 'dose-response' relationship.[9] Biologically plausible explanations of the association between smoking and back pain, particularly those related to the effect of smoking on nutrition of the disc have been reviewed by Ernst.[9] However; in this study we could not observe a significant association between smoking and obesity with low back pain.

In women, even after adjusting age, body mass index, type of delivery and sterilization, the association between lower socio economic status and low back pain was statistically significant. This study supports the

Table 4: Association of self reported Low Back Pain with socio-economic measures

	Men				Women			
	No. studied	% with LBP	Odds ratio	95% CI	No. studied	% with LBP	Odds ratio	95% CI
Socio-economic class								
Class 1 and 2	207	24.15	1		192	47.9	1	
Class 3,4 and 5	194	32.99	1.614**	1.02, 2.55	211	57.34	1.568**	1.02, 2.34
Education								
University and above	123	32.73	1		99	43.43	1	
Up-to higher secondary	278	32.73	1.894**	1.08, 3.31	304	55.92	1.33	0.80, 2.23
Occupation								
Others	283	26.15	1		363	50.14	1	
Manual laborers	118	33.9	1.412	0.88, 2.27	40	77.50	3.325**	1.49, 7.40

Odds ratio adjusted for age, smoking and body mass index in men and adjusted for age, body mass index, type of delivery and sterilization in women. LBP refers to low back pain. **$P < 0.05$

findings of Hagen KB.[25-27] The conclusion is that in this population socio-economic difference in reporting back pain cannot be explained by age, height, weight, body mass type of delivery and sterilization. The strongest association with reported back pain in women among the various measures which we examined was occupation. In general, women doing manual labor reported more back pain. The women of low socio economic status, because of their increased economic demand, may not take adequate rest during episode of back pain leading to inadequate healing and recurrence of back pain, which may be specific to Indian population. The increased reporting in back pain patterns by manual women workers compared with non-manual women workers suggests that the influence of manual work in the adult female population is stronger than the risk of sedentary work.

This study has several limitations. First, since the definition of low back pain is inconsistent, one should limit the comparison to the previous studies using a similar definition of low back pain. Second, the study population constituted of people living in field practice area of our health centre. For this reason, our findings may not be generalized to other socio-economic strata. In the main analysis, physical activity and use of Copper-T were not included which may confound the results. Third, the association of psychological factors on prevalence of low back pain was not elicited. Finally, the study design was cross sectional and a further prospective study is wanted to investigate the risk factors of low back pain in women and men. Despite these limitations, this study has several strengths. Systematic ways of data collection by the same investigators avoided inter observer variations. There are not many population studies conducted in India in this area. Additionally data on demographic background, reproductive history and anthropometric measurements collected allowed us to examine the associations between socio economic influences on low back pain. In conclusion, it seems clear that the poorer and more socially disadvantaged groups have a proportionally higher burden of this disabling symptom than the better off in society. While the etiological importance of these remains uncertain, back pain affords a clear example of the unequal experience of the socio economic status in the society. This leads to the need to search more variables like consumption of micro nutrients in the diet that are more commonly associated with low socio economic status.

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