Inclusion of bending, sitting cross leg and squatting together with standard questionnaires to measure Low Back Pain among Indians

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Abstract:

Low back Pain (LBP) is a common cause of activity limitations. Bending, settings cross leg and squatting is a routine practice in Indian Culture. Using present conditional specific standard questionnaires, it is not possible to gauge LBP induced by bending, sitting cross leg and squatting. Indians would be satisfied with the treatment if the LBP is relieved while bending, sitting cross leg and squatting.

Aim: *To understand level of LBP with sitting cross leg, bending and squatting and association of bending, sitting cross leg and squatting with standard LBP measures like ODI, RMDQ and VAS.*

Material and Method: *Cross sectional survey at orthopedic outpatient clinic. We recruited 200 patients who completed ODI (V2.1a), RMDQ, VAS, with demographic questionnaire including questions on bending, sitting cross leg and squatting in English and Marathi language.*

Results: *Average age was 47±15 years. 42% were men. One fourth had LBP while bending, 40% had LBP while sitting cross leg. Little more than half of patient had LBP while squatting and getting up from squatting. Significant correlation was observed for bending with RMDQ (r = .333, P<.0010; r=.264, p=0.008), and ODI (r = .355, p<.0001; r = .246, p = .001) for English and Marathi patients. Significant Correlation was observed for sitting cross leg with RMDQ (r = .375, P=.001; r =.265, p<.0001), ODI (r = .313, p<.0001, r=.369, p<.0001) and VAS (r =. 342, p =. 006; r = .229, p =.022) for both English and Marathi.*

Conclusion: *There is a need to focus on bending, sitting cross leg and squatting together with the standard LBP questionnaires for better diagnosis and management of LBP.*

Key words: *Low back pain, ODI, VAS, RMDQ, Bending, sitting, and squatting*

Introduction

Low back pain (LBP) is a common ailment for which patients visit primary care physician. LBP is defined as a non specific condition that refers to complaints of acute or chronic pain and discomfort in or near the lumbo sacral spine, which can be caused by inflammatory, degenerative, neoplastic, gynecological, traumatic, metabolic and other type of disorders[1].

Oswestry Disability Index (ODI (V 2.1a) [2-5], Roland Morris Disability Questionnaire (RMDQ)[6-7] and Visual Analog Score (VAS) [8] have been used to measure LBP in a wide variety of situations over past several years. Also ODI (V 2.1a) and RMDQ are available in many languages.

People experience LBP during various activities, doing menial work, sitting long hours at work, driving cars, or in front of the TV. This can take a toll on body's muscles and joints, especially when sitting with legs crossed or one leg under the butt. Sometimes LBP risk has been identified with prolonged sitting (Balague et al., 1988) [9], prolonged standing (Macfarlane et al., 1997) and lifting (Lee et al., 2001), although the exact basis for the risk for sitting is still debatable. A study conducted with 100 male miners showed that pain worsened after bending and lifting.[10] Pain when lifting and pain on repetitive bending were more likely to suggest mechanical LBP [11].

Critical review of 25 studies reported awkward posture also as independent cause for LBP. The same study reported that sitting in the same position for more than half a work day together with whole body vibration and awkward position, increased LBP.[12]

People in third world countries do not use chairs but sit on the ground or floor instead. Some of them have retained the ability to sit upright without back support. Buddha attained his enlightenment by just sitting (perhaps meditating) for several days with absolutely no back

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support.

Placing your legs under one another in a sitting position often referred to as cross leg. Some people may experience back pain in this position. Also sitting cross leg is essential posture while doing yoga that many Indians practice regularly.

People from Asian countries like China, Korea and India like to squat with their knees apart, with the backs of their ankles against their sitting bones and their elbows gently pressing on the inside of their knees. People from many Asian countries do not use western toilets and therefore squatting is common among them while use of Asian toilets.

In India, most people have to bend frequently as a part of daily activities like sweeping floor using a broom, picking up litter without any mechanical pick up tools, mopping the floor using cloth etc. Many people also eat their meals sitting on the floor. Some people sleep on the floor every day. By using ten dimensions mentioned in ODI (V 2.1a), it is possible to look at the LBP level for Pain intensity, Personal care, Lifting, walking, Sitting, Standing, Sleeping, Sex life, Social life and Travelling. However it is not possible to gauge pain induced by bending and sitting cross leg. One of the 24 questions from RMDQ is 'bending over'. However, the score used is only binary i.e. yes or no. We hypothesize that bending, sitting cross leg, and sitting in squatting position and getting up from squatting position is associated with LBP. Few researchers have tried to look at the pain level in different postures / activities among Indians and it will be interesting to look at them. Indians would be satisfied with the treatment if the LBP is relieved while bending, sitting cross leg and squatting.

The aim of this pilot study was...

a) To understand level of LBP while bending and sitting cross leg.

b) Using total ODI (V 2.1a), RMDQ and VAS score, to see if there is a significant difference between severe and not severe LBP for bending and sitting cross leg.

c) To see if there is a significant difference between scores of ODI (V 2.1a), RMDQ, VAS among severe and non severe LBP subjects categorized using scores for bending and sitting cross leg

d) To find association (correlation) of bending with ODI (V 2.1a), RMDQ, VAS and correlation of sitting cross leg with ODI (V 2.1a), RMDQ and VAS.

e) To understand what percent of patients experience severe LBP while squatting and getting up from squatting.

f) Further using ODI (V 2.1a), RMDQ and VAS score, to see if there is a significant difference between severe and not severe LBP for squatting.

Methods

This was a cross sectional survey conducted with patients from outpatient orthopedic clinic at one of the tertiary hospital in Pune, India. Since this is a part of the study titled Validity and Reliability of English and Marathi Oswestry Disability Index (ODI (V 2.1a)) in Indian population the method for this study is same [13].

In this study, we will now study two more dimensions, bending and sitting cross leg, measured on 0 to 5 likert scale and scored similar to ODI (V 2.1a) scores.

a.   Bending:-
   • I have no problem while bending
   • I can bend most of the times but have difficulty sometimes
   • I can bend only sometimes
   • I am apprehensive of bending
   • I can bend in sitting position but have difficulty to bend in standing position
   • I can bend forwards but have difficulty in attaining original position

b.   Sitting on the floor/Sitting cross legged:-
   • I can sit on the floor without having back pain
   • I am able to sit cross legged on the floor up to 30 minutes without having back pain
   • I am able to sit cross legged on the floor up to 10 minutes without having back pain
   • I am unable to sit cross legged on the floor but can sit cross legged on chair for 30 minutes without having back pain
   • I am unable to sit cross legged on the floor but can sit cross legged on chair for 10 minutes without having back pain.
   • I am unable to sit cross legged on the floor as well as on chair.

One more question was also asked on squatting. The answer was scored as binary "yes" and "no' category.

c.   Toilet Habits:-
   a) Which type of toilet do you use?   1) Western style 2) Indian style
   b) If you are using Indian style toilet, do you experience back pain while squatting position? 1] Yes 2] No
   c) If you are using Indian style toilet, do you experience back pain while standing up from squatting position? 1] Yes 2] No

These questions were applied to none operative patients (not operated for any reason), we considered mainly patients with mechanical back pain or degenerative disc

disease but same can be extrapolated for post operative cases individually.

All participants completed ODI (V2.1a), RMDQ, VAS, in addition to demographic questionnaire including questions on bending, sitting cross leg and squatting.

ODI covers topics concerning intensity of pain, lifting, ability to care for oneself, ability to walk, ability to sit, sexual function, ability to stand, social life, sleep quality, and ability to travel.

RMDQ: This list contains sentences that people have used to describe themselves when they have back pain. e.g. because of my back, I use handrail to get upstairs.

VAS: Measures pain intensity from 0 to 10. O is no pain.

Ethics:

Study was started after getting approval from Institutional Ethics Committee. All participants had signed informed consent form.

Statistical tests:

After checking normality assumptions, we used independent 't' test to examine the difference in the mean scores for ODI (V 2.1a), RMDQ and VAS among severe and non-severe LBP subjects categorised using bending, sitting cross leg and squatting scores (yes and no). Correlation coefficient to show the relation between bending, sitting cross leg with ODI (V 2.1a), RMDQ and VAS was calculated and correlations were compared using Fisher's Z test. Receiver Operating Characteristic curve (ROC) analysis was carried out to know sensitivity and specificity of these two (bending and sitting cross leg: treating them as continuous variables though they are actually discrete) new parameters against ODI (V 2.1a) scores used as reference standard by categorising subjects into severe and non-severe LBP

Result

A total of 200 subjects participated in the study. 100 patients answered English version of ODI (V 2.1a) and 100 patients answered Marathi version of ODI (V 2.1a). Significant difference was observed between those who answered in English and those who answered in Marathi. Therefore separate results have been reported for English and Marathi speaking participants.

As per Table 1, age wise, Marathi speaking participants were significantly (p<.0001) older as compared to English speaking participants (51.6 ± 15.1 vs 41.68 ± 15.5). Income wise Marathi speaking people earned significantly (p = .001) less income as compared to English speaking people (3.22 ± 1.01 vs 3.69 ± 0.91). Gender wise no significant difference was observed for the two languages. Significantly more English speaking participants had

graduate and above level of education (86% vs 44%, p <.0001) and were working (56% vs 17%, p <.0001). English speaking patients were significantly younger, higher educated, working and earned higher income compared to Marathi speaking patients.

Participants experienced higher pain while lifting, standing, social life (as per ODI (V 2.1a)) and sitting cross leg. Significantly more Marathi speaking participants experienced pain while bending as compared to English speaking participants (2.17 ± 1.33 vs 1.8 ± 1.07; p = .013) (Table 2).Severe LBP is defined as $\geq$ 40% ODI (V 2.1a) score [Defined by authors based on ROC curve for this study; since there is no reference available reference]. 25% had severe LBP with bending. 40% experienced severe LBP while sitting cross leg (Table 2). Those who answered in Marathi language, experienced significantly (p = .031) more LBP while bending as compared to those who answered in English language (2.17 ± 1.33 vs 1.8 ± 1.07)

Little more than half of the respondents had LBP while squatting (53%) and while standing up from squatting position (52%). Out of 45 participants who had answered in English, 20 (44.5%) participants experienced back pain in squatting position as well as standing up from squatting position. Out of 73 participants who had answered in Marathi, 36 (50%) experienced back pain in squatting position as well as while standing up from squatting position (Table 2).

I) Correlation of bending and sitting cross leg with total ODI (V 2.1A), RMDQ and VAS.

English (n = 100): (Table 3) Correlation between bending and RMDQ (r = .333, P<.0010), bending and ODI (V 2.1a) (r = .355, p<.0001) was significant but bending did not correlate significantly with VAS (r = .096, p = .342).

Correlation between sitting cross leg and RMDQ (r = .375, P=.001), sitting cross leg and ODI (V 2.1a) (r = .313, p<.0001) and sitting cross leg with VAS (r = 0. 342, p =. 006) was significant.

Marathi (n = 100): Correlation between bending and RMDQ (r = .264, p = .008) and bending and ODI (V 2.1a) (r = .246, P=.001) was significant but bending did not correlate with VAS (r = .138, p=0.137).

Correlation between sitting cross leg and RMDQ (r = .265, P<.0001), sitting cross leg and ODI (V 2.1a) (r = .369, p<.0001) and sitting cross leg with VAS (r = .229, p = .022) was significant. (Table 3)

ii) Difference between severe LBP (SLBP) and non severe LBP (NSLBP) on bending and sitting cross leg

Bending (English): T test showed significantly higher ODI (V 2.1a) score for SLBP on bending as compared to NSLBP on bending. ($46.2 +/- 11.05$ vs $37.9 +/- 12.4$, p =.025) as well as RMDQ (45.5 ± 11.9 vs 36.6 ± 12.4 P = .018) but not on VAS.

Bending: (Marathi): T test showed significantly higher

<table>
<tr><td colspan="6" style="text-align:center">Table 1: Demographic characteristics of participants</td></tr>
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Variables		English n1 = 100 (%)	Marathi n2 = 100 (%)	Total N =200 (%)	p-value
Gender	Male	44(44)	40(40)	84 (42)	Ns*
	Female	56(56)	60(60)	116 (58)	
Age (yr)	<30	31(31)	13(13)	44(22)	<.0001
	30–49	37(37)	30(30)	67(33.5)	
	> 50	32(32)	57(57)	89(44.5)	
	mean (SD)	42(15)	52 (15)	47 (15)	
Duration of low back pain(Days)	<90	68(68)	57(57)	125(62.5)	Ns*
	>90	32(32)	43(43)	75(37.5)	
		(missing = 1)	(missing = 1)	(missing = 2)	
Education	Up to graduation	13(13)	55(55)	64(34.3)	<.0001
	Graduation & above	86(86)	44(44)	130(65.7)	
Occupation	Working	56(56)	17(17)	73(36.5)	<.0001
	Non Working	44(44)	83(83)	127(63.5)	
		(missing = 2)	(missing = 1)	(missing = 3)	
Income `(Rs.)	<15000/month	41(41)	62(62)	103(51.5)	0.003
	≥15000/month	57(57)	37(37)	94(47.7)	

*Ns = Not significant

ODI (V 2.1a) score for SLBP on bending as compared to NSLBP on bending. (50.0 ±15.77 vs 40.55 ±15.30, p=0.005) but no significant difference was observed with VAS and RMDQ.

Sitting cross leg: (English): T test showed significantly

<table>
<tr><td colspan="4">Table 2: LBP related score of participants on bending, sitting cross leg, squatting, ODI, RMDQ and VAS</td></tr>
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Variables	English n1 =100 (%)	Marathi n2 = 100 (%)	Total N=200 (%)
ODI score			
Minimal (0% to 20%)	12(12)	09(9)	21(10.5)
Moderate (21% to 40%)	46(46)	35(35)	81(40.5)
Severe (41% to 60%)	39(39)	47(47)	86(43.0)
Crippled (61% to 80%)	03(3)	08(8)	11(5.5)
Bed bound (81% to 100%)	0	01(1)	01(0.5)
Bending		(missing = 1)	(missing = 1)
Minimal (0% to 20%)	38(38)	36(36.4)	74(37.2)
Moderate (21% to 40%)	49(49)	28(28.3)	77(38.7)
Severe (41% to 60%)	06(6)	19(19.2)	25(12.6)
Crippled (61% to 80%)	02(2)	08(08.1)	10(5)
Bed bound (81% to 100%)	05(5)	08(08.1)	13(6.5)
Sitting cross leg		(missing = 1)	(missing = 1)
Minimal (0% to 20%)	50(50)	32(32.4)	82(41.2)
Moderate (21% to 40%)	9(9)	30(30.1)	39(19.6)
Severe (41% to 60%)	16(16)	09(09.1)	25(12.6)
Crippled (61% to 80%)	12(12)	07(07.1)	19(9.5)
Bed bound (81% to 100%)	13(13)	21(21.2)	34(17.1)
Squatting	N=73	N=45	N=118 p-value
a - Squatting position - yes	22(48.9)	41(56.2)	63 (53.4) ns*
b - While getting up - yes	41(46.7)	40(54.8)	61 (51.7) ns*
	English (Mean±SD**)	Marathi (Mean±SD**)	p value
Pain intensity	2.05 ±0.77	2.29 ± 0.92	0.426
Personal care	1.23 ± 0.61	1.27 ±0.82	0.059
Lifting	3.12 ± 1.37	3.5 ± 1.38	0.529
Walking	1.52 ± 0.70	1.41± 1.01	0.082
Sitting	1.87 ±0.83	2.23 ±1.16	0.313
Standing	2.72 ± 1.19	3.05 ±1.18	0.427
Sleeping	1.19 ±0.66	1.30 ± 0.9	0.005
Sex life	1.32 ±0.97	1.89 ±1.69	0.459
Social life	2.24 ±1.20	2.53 ±1.54	0.147
Travelling	1.81 ±1.13	2.41±1.62	0.465
Bending	1.8 ± 1.07	2.17± 1.33	0.031
Sitting cross leg	2.22 ± 1.58	2.28 ± 1.61	0.242

*ns = Not significant / **SD = Standard deviation

higher RMDQ score for SLBP on sitting cross leg as compared to NSLBP on sitting cross leg. (40.97 ± 13.4 vs 35.7 ± 11.8, p<.0001) but not for ODI (V 2.1a) and VAS.

Sitting cross leg: (Marathi) (Figure 2b): t test showed significantly higher ODI (V 2.1a) score for SLBP on sitting cross leg as compared to NSLBP on sitting cross leg. (51.19 ±16.09 vs 39.89 ±14.47 p<0.001) but no significant difference was observed with VAS and RMDQ.

Bending: English and Marathi

ROC analysis was also conducted to compare ODI (V 2.1a) scores of severity as compared to non severity as against bending and sitting cross leg. For bending and English language AUC did not show significant results. Those who answered Marathi AUC = 0. .623 p=0.037, 95% CI: 0.511. - 0.734.

For sitting cross leg and English language, AUC did not show significant result. For Marathi AUC = 0. .622 p=0.039, 95% CI: 0.510 - 0.733 (Table 4). Non severe and severe pain could be differentiated well with ROC for bending and sitting cross leg among those who had answered in Marathi.

Test retest: When bending and sitting cross leg scores were retested within two weeks time (post test) no significant difference was observed between pre (first visit) and post test for bending and sitting cross leg. Test retest correlation for bending was 0.978 and for sitting cross leg was 0.983, reporting good test retest reliability.

<table>
<tr><td colspan="3">Table 3: Correlation of bending & sitting cross leg scores with ODI, RMDQ & VAS Scores for both English and Marathi language</td></tr>
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English	Bending	Sitting cross leg
Variable	R P- Value	R P- Value
ODI	0.355, <.0001	0.313, <.0001
RMDQ	0.333, 0.001	0.375, 0.001
VAS	0.096 0.342	0.342 0.006
Marathi	**Bending**	**Sitting cross leg**
	R P- Value	R P- Value
ODI	0.246, 0.001	0.369, <.0001
RMDQ	0.264, 0.008	0.265, <.0001
VAS	0.138 <.174	0.229, 0.022

Squatting: Out of 200 participants, 118 used Indian toilets. Out of those who used Indian toilets, little more than half (53%) experienced LBP in squatting position. 51.7% experienced LBP while standing up from squatting position (Table 4). About 45% experienced LBP in squatting as well as standing up from squatting position. Severs LBP with Squatting and standing up from squatting showed significantly (p<.05) higher ODI (V 2.1a), scores as compared to less severe LBP. (Table 4 and 5).

Table 4: ROC results for bending scores vs ODI scores (severe and not severe) using both for English and Marathi language

	Area	Std. Error	Asymptotic Sig.	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
English	0.543	0.059	0.471	0.428	0.658
Marathi	0.623	0.057	0.037	0.511	0.734

Squatting (For English)

T test showed significantly higher ODI (V 2.1a) score for Those who had LBP while squatting as compared to those who did not experience LBP (40.82 ±11.19 vs 32.30 ±11.72, p=0.017) as well as for RMDQ (39.39 ±12.25 VS 31.88 ±10.71, p= 0.034) but the same significant difference was not observed with VAS. (Table 6).

Squatting (For Marathi)

T test showed significantly higher ODI (V 2.1a) score for those who had LBP while squatting as compared to those

Table 5: ROC results for sitting cross leg scores vs ODI scores (severe and not severe) using both for English and Marathi language

	Area	Std. Error	Asymptotic Sig	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
English	0.541	0.06	0.486	0.423	0.66
Marathi	0.622	0.057	0.039	0.51	0.733

who did not experience LBP. (47.24 ±13.88 vs 37.78 ±14.32, p=0.006) but not significant with VAS and RMDQ. (Table 6).

Standing up from squatting (For English):

T test showed significantly higher ODI (V 2.1a) score for those who had LBP while standing up from squatting position as compared to those who did not experience LBP (39.6833 ±12.40 vs 31.9442 ±10.55 , p=0.029) as well as for RMDQ (62.3810 ±16.09 VS 50.8333 ±17.92, p= 0.029) and for VAS (40.57 ±12.01 VS 32.88 ±11.27 p= 0.032). (Table 7)

Standing up from squatting (For Marathi):

T test showed significantly higher ODI (V 2.1a) score for

Table 6: Comparison of Mean (±SD) RMDQ, VAS and ODI scores among subjects experiencing severe and non severe LBP while squatting position using Indian style toilet

		Pain experienced	N	Mean ± SD	p value#
English	RMDQ	Yes	22	39.3950 ±12.24858	0.034
		No	23	31.8835 ±10.70563	
	VAS	Yes	22	60.4545 ±17.31426	0.122
		No	23	52.1739 ±17.82657	
	ODI	Yes	22	40.8182 ±11.19369	0.017
		No	23	32.3043 ±11.71803	
Marathi	RMDQ	Yes	41	42.7846 ±16.64157	0.984
		No	32	42.7094 ±14.54955	
	VAS	Yes	41	60.2439 ±18.90606	0.431
		No	32	56.5625 ±20.73012	
	ODI	Yes	41	47.2439 ±13.88125	0.006
		No	32	37.7813 ±14.31384	

those who had LBP while standing up from squatting position as compared to those who did not experience LBP. (46.57 ± 13.67 vs 38.87 ±15.10, p=0.025) but not significant with VAS and RMDQ. (Table 7)

In summary, those who experience severe LBP reported higher ODI (V 2.1a), RMDQ and VAS scores on

Table 7: Comparison of Mean (±SD) RMDQ, VAS and ODI scores among subjects experiencing severe and non severe LBP while squatting position using Indian style toilet

		Pain experienced	N	Mean ± SD	P value#
English	RMDQ	Yes	21	39.6833 ±12.40459	0.029
		No	24	31.9442 ±10.54629	
	VAS	Yes	21	62.3810 ±16.09496	0.029
		No	24	50.8333 ±17.91688	
	ODI	Yes	21	40.5714 ±12.00655	0.032
		No	24	32.8750 ±11.26870	
Marathi	RMDQ	Yes	40	42.5005 ±16.51154	0.881
		No	33	43.0561 ±14.79227	
	VAS	Yes	40	61.0000 ±19.84556	0.26
		No	33	55.7576 ±19.36981	
	ODI	Yes	40	46.5750 ±13.67927	0.025
		No	33	38.8788 ±15.10331	

Using independent 't' Test

squatting, standing up from squatting, bending and sitting cross leg as compared to those who experience not severe LBP.

Discussion

This pilot study has reported that little above 50% participants experienced LBP from squatting.. About one fourth participant experienced LBP while bending and 40% experienced pain while sitting cross leg. Sitting cross leg showed significant association with ODI, VAS and RMDQ for both English and Marathi patients. Bending showed significant association with ODI and RMDQ. ROC results could differentiate severity of LBP using ODI (V 2.1 a) score for bending and sitting cross leg (p= .03) with Marathi patients. These convincing results show that bending, sitting cross leg and squatting should be included together with standard measures to measure LBP.

Patients experienced higher LBP while lifting, standing and sitting cross leg as compared to other activities measured on ODI (V 2.1a). Significantly more Marathi speaking participants experienced pain while sleeping and bending. It could be because they were older as compared to English speaking participants. If the physician does not ask the patients about LBP experienced due to various day to day movements / activities, the precise diagnosis may not be possible in these patients. Since the physician has limited time to conduct a complete examination, asking targeted structured questions would help the diagnosis, education to the patient, treatment and management of the disease.

Patients from different cultures / geographic areas should

be studied to better understand their experience with LBP while bending, sitting cross leg and squatting. There may be variation in severity of pain while bending hence the categories / options and scale for bending, sitting cross leg and squatting needs to be studied further.

In India, in rural area, the same score may be different. A comprehensive study should be conducted with urban and rural population to look at the differences and to design interventions. There is a need to develop a separate questionnaire to assess LBP among Indians.

Limitations: This study was conducted only with people from urban area. Another limitation was unavailability of research studies with LBP while bending, sitting cross leg and squatting with general population. Therefore we are unable to compare our result with other studies.

Conclusion

People do experience LBP while bending, sitting cross leg and squatting. Since these are the every day activities among people from Asia, researchers should use them along with the other standard measures. More research needs to be conducted to develop a separate questionnaire for Indian and or Asian population.

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