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ORIGINAL ARTICLE

Risk factors associated with chronic low back pain in Syria

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ABSTRACT

Background: We aimed to identify risk factors associated with chronic low back pain (C-LBP) in Syria. **Materials and Methods:** We conducted the study in a busy outpatient neurology clinic in Damascus city from October 2011 to August 2012. We enrolled all eligible adults presenting with C-LBP along with those who denied any back pain as a controls. We considered C-LBP any LBP lasting over 3 months. We developed our own questionnaire. A clinical nurse interviewed each person and filled in the results. **Results:** We had a total of 911 subjects; 513 patients and 398 controls. We found that C-LBP increased with age. Having a sibling with C-LBP was a strong predictor of C-LBP. In women obesity, but not overweight, was a risk factor. Number of children was a risk factor for mothers. Higher level of education decreased the chance of C-LBP in women. Sedentary job increased the risk of C-LBP. **Conclusion:** This study sheds some light on risk factors for C-LBP in our population and might help find possible preventive measures.

Key words: Family history, low back pain, obesity, waist circumference, waist to hip ratio

INTRODUCTION

Chronic low back pain (C-LBP) is a common complaint in neurology practices. It has a tremendous cost in sick-leave, management and pain and suffering.[1,2] The estimated annual prevalence is 10–13%.[3,4] C-LBP is estimated to be about 20% of all patients we see in the location of this study. The risk factors continue to be disputed.

Previous studies have yielded inconclusive results concerning the association between LBP and body mass index (BMI).[5-7] Other possible risk factors were studied; waist circumference (WC),[8-10] hip circumference (HC),[8] waist to hip ratio (WHR),[8,9,11,12] smoking,[2,8,13-15] hypertension,[4] diabetes mellitus,[4,14] marital status,[14,16] exercise,[2,16,17] depression,[4,14,18] anxiety,[14,18] and family history of LBP.[19,20] Inverse relationship was reported between education level and LBP.[13,21-23] Previous studies have also explored the association between LBP and work related factors such as lifting heavy objects,[16,20,24,25] bending,[24,25] and prolonged standing.[25]

To our knowledge, no previous study was carried out in Syria. Our objective is to clarify some of these risk factors in our population. We aim also to explore the effect of number of pregnancies and children particularly in a community where a high number is very common.[4]

MATERIALS AND METHODS

We conducted the study on C-LBP in adults (age 18-year-old and above) in a busy outpatient neurology clinic between October 2011 and August 2012. C-LBP was defined as any LBP lasting more than 3 months.[3,19,26]

Inclusion criteria

- Patients who presented with C-LBP
- Adults over the age of 18 years.

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Exclusion criteria

- Cancer, trauma or known vertebral fractures
- Work-compensation claim or pending litigation related to the medical problem.

Informed consent was obtained from all those who agreed to participate, which complied with the principles outlined in Declaration of Helsinki (59th WMA General Assembly, Seoul, Korea, October 2008).

A questionnaire was filled by a nurse trained to interview each person. She filled in their answers and took their study required anthropomorphic measurements [Table S1]. WC was measured midway between the lower rib margin and the superior border of the iliac crest using a tape measure while the participant was standing with feet together and breathing gently.[27] We divided WC into groups (≤80, 81–90, 91–100, >100). HC was measured in centimeters. The measuring tape was placed around the maximum circumference of the buttocks in horizontal position.[28] We divided HC into groups (≤100, 101–110, 111–120, >120). We divided BMI in groups (<25 kg\m^2, 25–29.99 overweight, ≥30 obese) and WHR in groups (≤0.8, >0.8, and ≤ 0.9, >0.9).

We had a total of 952 subjects who agreed to participate in the study. There were 398 control subjects and 554 C-LBP patients of whom 41 patients were excluded for not meeting inclusion criteria.

Control subjects are those who denied having any back pain at any time. We took our controls from family members or friends escorting patients with symptoms unrelated to back pain such as migraine, Parkinson's disease, stroke, and multiple sclerosis.

We divided participants into age groups; 18–30, 31–40, 41–50, 51–60, 61–70, and >70 years old. We categorized level of education as follows: Illiteracy, elementary (under 7th grade), high school (from 7th grade to 12th grade), and university (above high school). We asked about current smoking as a habit without specification of the amount. We took marital status as single and non-single (married, divorced, widow). We grouped subjects according to the number of their children: 1–3, 4–6 and >6 children. Patients with diabetes mellitus and systemic hypertension were categorized by their presence or absence. We inquired about the regular physical activity, but we did not inquire about type, duration or consistency. We asked if the patient has had anxiety or depression regardless of the onset of C-LBP. When asked about prolonged sitting or standing at work; we did not specify number of hours but asked if it was most of the time during work. We divided number of pregnancies into groups; 1–3, 4–6 and >6 pregnancies. Regarding the family history of LBP, we asked only about siblings. We thought this would provide more accurate and reliable information since we have many large families locally.

Statistical analysis

We tested factors associated with C-LBP in a univariate logistic regression model. In a next step, we tested all statistically significant variables from the univariate testing in a multiple logistic regression model. Descriptive statistics of frequencies and percentages were used to describe the variables. Odds ratios (OR) and corresponding 95% confidence intervals (95% CI) were used to analyze the data. The level of $P < 0.05$ was considered as a cut-off value for significance, and all P values were two-sided. The statistical package for Social Sciences, version 21.0 (SPSS Inc., Chicago, IL, USA) was used for all calculations.

RESULTS

A total of 911 subjects answered the questionnaire and met our inclusion criteria. There were 379 women and 134 men in the case group, and 263 women and 135 men in the control group. Subjects with C-LBP were more likely to be females. The largest number (105 women and 37 men) of those with C-LBP were between 41 and 50 years old [Figure 1].

Table 1 presents means and standard deviations for some factors associated with C-LBP which are: Age, children number, pregnancies number, height, weight, BMI, WC, HC, and WHR. These variables are presented in men and women separately with\without C-LBP.

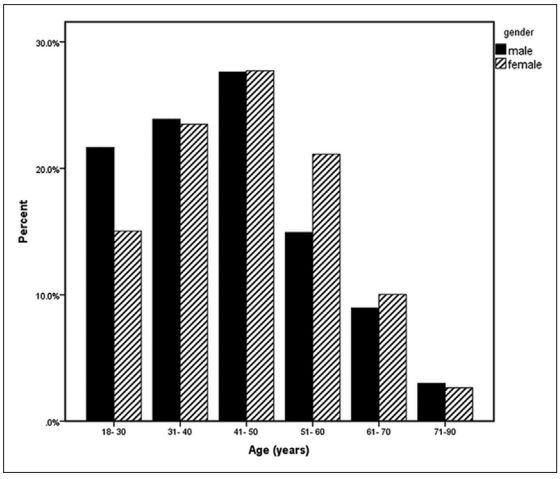

Figure 1: Percentages of chronic low back pain patients in different age groups with regard to total male and female patients separately (n = 134 males, 379 females)

Obesity (BMI ≥ 30) was found in 31.9% in control men and 30.4% in control women. We found 164 smokers (18%) in the whole group. Illiteracy was found in 46 (5%) subjects. Few women had more than 12 children.

Table 2 presents OR (including 95% CI) as univariate analysis for education level, number of children, number of pregnancies, route of delivery, marital status, intra-uterine device use, and smoking in men and women separately. Table 3 presents OR (including 95% CI) as univariate analysis for BMI, WHR, WC, HC, hypertension, diabetes mellitus, regular sport, and family history in men and women separately. Table 4 presents OR (including 95% CI) as univariate analysis for work-hours per week, lifting heavy objects, bending, prolonged sitting, prolonged standing, and mood. Then we adjusted the significant results for age by using multiple logistic regressions [Tables 5 and 6].

We found positive family history in 26.5% of men and 41% of women. It was significantly associated with C-LBP in both men and women; the OR was 9.73 with (95% CI: 4.69–20.18), $P < 0.001$ in men and 6.98 with (95% CI: 4.74–10.26), $P < 0.001$ in women. This strong association remained significant after adjustment for age; (OR = 9.52,

Table 1: Means and SDs for some factors associated with C-LBP in men and women

	Men					Women				
	N of C-LBP\non*	C-LBP		No C-LBP		N of C-LBP\non*	C-LBP		No C-LBP	
		Mean	SD	Mean	SD		Mean	SD	Mean	SD
Age (years)	134\135	43.2	14.2	39.5	15.8	379\263	44.9	13	38.8	12.3
Number of children	107\82	4.1	2.6	3.8	2	321\181	4.5	2.2	3.8	1.9
Number of pregnancies						321\184	5.3	2.9	4.5	2.4
Height (cm)	133\135	174.1	8	173.6	7.2	378\263	158.7	6.5	159.7	6
Weight (kg)	133\135	84.6	15.9	85.2	15.9	377\263	77.7	15.9	70.7	14.1
BMI (kg\m^2)	133\135	27.9	4.8	28.3	4.9	377\263	30.9	6.3	27.8	5.6
WC (cm)	133\135	98.3	13.5	98.8	12.1	377\262	93.9	14.2	86.5	12.7
HC (cm)	133\135	105.7	9.5	105.6	8.4	377\262	111.3	12.4	105.2	11
WHR	133\135	0.9	0.1	0.9	0.1	377\262	0.8	0.1	0.8	0.1

*Means no C-LBP. BMI: Body mass index, HC: Hip circumference, C-LBP: Chronic low back pain, N of: Number of subjects, SD: Standard deviation, WC: Waist circumference, WHR: Waist to hip ratio

Table 2: Relative frequencies of men and women with and without C-LBP and factors associated with C-LBP tested by univariate logistic regression model

Variable (men\women)	Men C-LBP				Women C-LBP			
	Yes (%)*	No (%)†	OR	95% CI	Yes (%)*	No (%)†	OR	95% CI
Education level								
University (106\210)	38.1	40.7	1.00		27.7	39.9	1.00	
High school‡ (110\248)	44	37.8	1.25	0.73-2.13	40.1	36.5	**1.58**§	1.09-2.3
Elementary‖ (47\144)	14.2	20.7	0.7	0.37-1.47	24	20.2	1.72	1.11-2.65
Illiteracy (6\40)	3.7	0.7	5.39	0.61-47.73	8.2	3.4	3.44	1.56-7.59
Number of children								
1-3 (95\213)	51.4	48.8	1.00		37.2	51.9	1.00	
4-6 (73\223)	36.4	41.5	0.83	0.45-1.54	46.3	41.4	1.56	1.06-2.3
>6 (21\65)	12.1	9.8	1.18	0.44-3.12	16.6	6.6	3.49	1.76-6.9
Number of pregnancies								
1-3 (161)					26.8	40.8	1.00	
4-6 (219)					45.5	39.7	1.74	1.15-2.65
>6 (125)					27.7	19.6	2.16	1.31-3.54
Route of delivery								
Vaginal (343)					69.6	66.9	1.00	
Cesarean section (63)					10.7	16	0.64	0.37-1.1
Both (94)					19.7	17.1	1.11	0.68-1.8
Marital status								
Single (62\109)	13.4	32.6	1.00		12.1	24	1.00	
Non-single (207\533)	86.6	67.4	3.12	1.69-5.75	87.9	76	2.28	1.5-3.47
Intrauterine device (504)					51.4	48.1	1.14	0.79-1.64
Smoking (269\642)	38.8	39.3	0.98	0.6-1.6	11.1	6.5	1.8	1-3.24

*Percentage of total number of C-LBP patients, †Percentage of total number of intact subjects, ‡From 7th grade to 12th grade, §Significant OR values are shown in bold, ‖Under 7th grade. C-LBP: Chronic low back pain, CI: Confidence interval, OR: Odds ratio

Table 3: Relative frequencies of men and women with and without C-LBP and factors associated with C-LBP tested by univariate logistic regression model

Variable (men\women)	Men				Women			
	C-LBP				C-LBP			
	Yes (%)*	No (%)†	OR	95% CI	Yes (%)*	No (%)†	OR	95% CI
BMI (kg\m^2)								
<25 (72\171)	30.1	23.7	1.00		19.9	36.5	1.00	
25-29.99 (117\195)	42.9	44.4	0.76	0.42-1.37	28.6	33.1	**1.59**‡	1.05-2.4
≥30 (79\274)	27.1	31.9	0.67	0.35-1.27	51.5	30.4	3.1	2.08-4.63
WHR								
<0.8 (12\206)	6	3	1.00		26.8	40.1	1.00	
>0.8-0.9 (66\341)	22.6	26.7	0.42	0.11-1.52	54.9	51.1	1.61	1.13-2.28
>0.9 (190\92)	71.4	70.4	0.5	0.15-1.72	18.3	8.8	3.12	1.81-5.38
WC (cm)								
<80 (21\168)	9	6.7	1.00		18.6	37.4	1.00	
81-90 (42\169)	15.8	15.6	0.75	0.26-2.15	27.6	24.8	2.24	1.45-3.46
91-100 (79\142)	28.6	30.4	0.7	0.26-1.83	22.3	22.1	2.03	1.29-3.19
>100 (126\160)	46.6	47.4	0.73	0.29-1.85	31.6	15.6	4.06	2.54-6.5
HC (cm)								
≤100 (71\167)	27.8	25.2	1.00		19.1	36.3	1.00	
101-110 (136\209)	48.9	52.6	0.84	0.47-1.49	32.6	32.8	1.89	1.25-2.85
111-120 (46\156)	15.8	18.5	0.77	0.37-1.62	27.1	20.6	2.49	1.59-3.91
>120 (15\107)	7.5	3.7	1.84	0.57-5.92	21.2	10.3	3.91	2.29-6.66
Hypertension (269\642)	16.4	11.9	1.46	0.73-2.92	27.2	13.7	2.35	1.55-3.56
DM (269\642)	11.2	11.1	1.01	0.47-2.16	12.7	8	1.67	0.98-2.87
Regular sport (269\642)	18.7	17	1.12	0.6-2.09	8.7	14.8	0.55	0.34-0.9
Positive family history (264\634)	44.8	7.7	9.73	4.69-20.18	58	16.5	6.98	4.74-10.26

*Percentage of total number of C-LBP patients, †Percentage of total number of intact subjects, ‡Significant ORs are shown in bold. DM: Diabetes mellitus, C-LBP: Chronic low back pain, CI: Confidence interval, OR: Odds ratio, HC: Hip circumference, WHR: Waist to hip ratio

Table 4: Relative frequencies of people with and without C-LBP and factors associated with C-LBP tested by univariate logistic regression model

Variable (subjects no)	C-LBP			
	Yes (%)	No (%)	OR	95% CI
Work (h)				
No work (563)	63.7	60.3	1.00	
≤35 (107)	10.2	13.9	0.69	0.46-1.05
>35 (235)	26.1	25.8	0.96	0.7-1.3
Lifting heavy objects				
Non* (283)	80.9	82.9	1.00	
Daily (32)	10.6	7.6	1.44	0.68-3.05
Nondaily (31)	8.5	9.5	0.92	0.44-1.93
Awkward positions				
Non† (123)	29	43.1	1.00	
Bending (14)	4.8	3.1	2.3	0.73-7.63
Prolonged sitting (116)	37.6	28.8	**1.94**‡	1.16-3.22
Prolonged standing (93)	28.5	25	1.69	0.98-2.92
Mood				
Good (878)	95.3	97.7	1.00	
Depression (22)	3.5	1	3.58	1.2-10.66
Anxiety (11)	1.2	1.3	0.96	0.29-3.15

*Workers who do not lift heavy objects, †workers who do not work in awkward positions, ‡Significant OR values are shown in bold. C-LBP: Chronic low back pain, CI: Confidence interval, OR: Odds ratio

95% CI: 4.57–19.82), $P < 0.001$, (OR = 6.36, 95% CI: 4.3, 9.41), $P < 0.001$ for men and women, respectively.

DISCUSSION

To our knowledge, this is the first study to be conducted about C-LBP in Syria. We found a higher rate of C-LBP in women as found in other studies.[13,14,16,29]

Regarding the family history of LBP, the very high rate of another sibling with LBP might suggest hereditary/congenital susceptibility to C-LBP. Only limited literature is available about this issue.[19,20] Should this hold true in future studies, it would have many implications including a preemptive early risk-management approach.

Based on increasing mechanical force on the person's back, we expected to find a linear correlation with weight in our patients. However, we found significant correlation only in obese women similar to a few studies.[2,8,9,30] While some previous studies reported a positive association to increasing BMI,[4,6,13,14,23,31] others did not.[11,32,33]

We found that higher HC, WC, and WHR increased the risk of C-LBP in women but not in men. Previous studies found this association of higher WC[8,10] and WHR[2,8,9,12] with LBP only in women, while a positive association of higher HC was reported in both men and women in another study.[8] This is in contrast with the cardiovascular risk where a thinner waist and a larger hip are protective.[34] A Chinese study by Yip *et al*.[11] found an inverse relation of WHR to LBP.

Table 5: Risk factors for C-LBP tested in a multiple logistic regression model (adjusted for age)

Variable	Men		Women		Total	
	OR	95% CI	OR	95% CI	OR	95% CI
Number of children						
1-3			1.00			
4-6			1.33	0.87-2.03		
>6			**2.61***	1.24-5.5		
Number of pregnancies						
1-3			1.00			
4-6			1.46	0.94-2.27		
>6			1.54	0.88-2.72		
Marital status						
Single	1.00		1.00		1.00	
Nonsingle	3.1	1.52-6.32	1.58	1.01-2.47	1.88	1.3-2.74
Smoking			1.85	1.02-3.36		
Hypertension			1.45	0.91-2.32		
Regular sport			0.6	0.36-0.99		
Education level						
University			1.00			
High school†			1.52	1.04-2.22		
Elementary‡			1.36	0.87-2.14		
Illiteracy			1.96	0.86-4.48		
Family history	9.52	4.57-19.82	6.36	4.3-9.41	7.1	5.05-9.99
Prolonged sitting					1.99	1.18-3.36
Depression					3.81	1.27-11.44

*Significant OR values are shown in bold, †From 7th grade to 12th grade, ‡Under 7th grade. C-LBP: Chronic low back pain, CI: Confidence interval, OR: Odds ratio

Table 6: Risk factors for C-LBP tested in a multiple logistic regression model (adjusted for age)

Variable	Men		Women		Total	
	OR	95%CI	OR	95%CI	OR	95%CI
WHR						
≤0.8			1.00			
>0.8-0.9			1.23	0.85-1.78		
>0.9			**1.88***	1.04-3.4		
WC (cm)						
≤80			1.00			
81-90			1.87	1.19-2.93		
91-100			1.5	0.92-2.46		
>100			2.56	1.48-4.42		
HC (cm)						
≤100			1.00			
101-110			1.51	0.98-2.33		
111-120			1.81	1.12-2.93		
>120			2.58	1.45-4.59		
BMI (kg\m^2)						
<25			1.00			
25-29.99			1.27	0.83-1.97		
≥30			2.14	1.37-3.33		

*Significant OR values are shown in bold. BMI: Body mass index, C-LBP: Chronic low back pain, CI: Confidence interval, HC: Hip circumference, OR: Odds ratio, WC: Waist circumference, WHR: Waist to hip ratio

Cigarette smoking is generally reported to be a weak risk factor for LBP.[15] Many studies have shown this risk;[2,8,14,16,19] some have reported this in women,[13] and some have not.[4,22,33] In our study, it has showed a weak association with C-LBP only in women.

We found non-single status to be associated with C-LBP in both men and women, which is similar to other studies.[14,16] Diabetes mellitus and hypertension were not associated with C-LBP, which is consistent with Altinel *et al*.,[4] but not another study.[18]

Regular physical activity appeared as a protective factor from C-LBP similar to another study.[16] However, in our study this was only true for women. We found a positive association between depression and C-LBP similar to some studies[4,14] and in contrast to another one.[18]

We have many families with large number of children in our community and it is not uncommon to see families with >6 children. We, therefore, asked about number of children and pregnancies, a factor hardly studied previously. We did find a correlation with number of children in female patients. However, we cannot isolate the burden of raising the children as a superimposed factor due to the fact that the study is performed in a community where mothers carry this responsibility while men work outside earning a living. Higher number of pregnancies was not associated with C-LBP in our study while a Turkish study by Altinel *et al*.[4] found the contrary.

Several studies reported an inverse relationship of education level to LBP.[13,21-23] It can be speculated that higher education decreases risk due to less demanding work and better back-hygiene and habits in daily activities, but it is difficult to explain why it is helpful only in females. We can explain the lack of risk of illiteracy in men by having very few cases (6 cases) in this group.

Work related factors as working-hours per week, heavy weight lifting, bending, and prolonged standing showed no significant correlation with C-LBP in our study, which is surprising since other studies showed the contrary.[24,25] We did not evaluate the role of chores among women most of whom were housewives. Their risks include harmful positions such as bending, lifting children and prolonged standing. In our questionnaire, those who worked inside were labeled as nonworkers. This issue clearly needs to be addressed in future studies.

Finally, this study has several limitations; we do not have a confirmed etiology for the pain in our patients in the study. Nonetheless, all of them fit our definition of C-LBP. Lack of work-up in many patients is mainly due to financial reason and available resources. Most of our patients did not have medical insurance. Accordingly, it is not uncommon for our patients to be lost to follow-up. Furthermore, we cannot comment on treatment since we do not have full work up and/or follow-up on all the patients. Despite the limitation of specific etiology of C-LBP, we have interesting findings in regards to many risk factors studied.

CONCLUSION

This study shows some of the factors associated with C-LBP and should be helpful in directing effort for prevention. In women we found obesity ($P = 0.001$), increased WC ($P = 0.001$ for WC > 100 cm), increased HC ($P = 0.001$ for HC > 120 cm), higher WHR ($P = 0.37$ for WHR > 0.9), lower level of education ($P = 0.31$), having more than 6 children ($P = 0.012$), and smoking ($P = 0.45$) to be associated with C-LBP. We found that positive family history had a high level of significant association with C-LBP in both men and women ($P < 0.001$). Furthermore, being non-single ($P = 0.001$) and prolonged sitting at work ($P = 0.01$) were important risk factors for C-LBP.

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Conflicts of interest

There are no conflicts of interest.

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Supplementary Table

Table S1: Supplementary material. Questionnaire for our C-LBP study

ID
Phone number
Education level
  Illiteracy
  Elementary*
  High school†
  University
Gender
  Male\female
  If female, then
    Use of intra uterine device
    Number of pregnancies
    Route of birth
      Vaginal
      Cesarean section
      Both
Age in years
Regular smoker
  Yes\no
Marital status
  Single\nonsingle‡
Number of children
Number of siblings
Does anyone of the siblings have C-LBP?
  Yes\no
If "yes," how many?
Hypertension
  Yes\no
DM
  Yes\no
Regular sport
Yes\no
Height (cm)
Weight (kg)
WC (cm)
HC (cm)
Mood
  Good\depressed\anxious
Work
  Yes\no
If "yes," then
  Weekly work hours
  Does work imply
Lifting heavy objects? (yes\no)
If "yes;" frequency
  Daily\nondaily
Awkward positions? (yes\no)
If "yes;" what kind?
  Bending
  Prolonged sitting
  Prolonged standing
Low back pain
  Yes\no
If "yes," pain duration (months)
  ≤3
  >3

*Under 7th grade, †From 7th grade to 12th grade, ‡"Nonsingle" includes married, widow or divorced. C-LBP: Chronic low back pain, WC: Waist circumference, DM: Diabetes mellitus