ORIGINAL ARTICLE

FUNCTIONAL IMPACT OF LOW BACK PAIN IN THE POPULATION OF SALVADOR-BAHIA, BRAZIL

Katia Nunes Sá, Renato Santos E Dias**, Israel Souza***, Ines Lessa****, Abrahão Fontes Baptista******

Corresponding author: Abrahão Fontes Baptista

Laboratório de Eletroestimulação Funcional

Av. Reitor Miguel Calmon, Instituto de Ciências da Saúde, sala 306 – Vale do Canela

CEP: 40.110-902 Salvador, BA, Brasil.

Tel: +55 71 3283-8906 Mobile: +55 71 98883-5058

E-mail address: afbaptista@ufba.br

* PhD, Post-graduation Department and Neuromusculoskeletal Research Group, Bahiana School of Medicine and Public Health, Salvador, BA, Brazil.

** MSc, Post-graduate Program on Medicine and Health. Federal University of Bahia, Salvador, BA, Brazil

*** PhD, Federal Institute of Education, Science and Technology of Rio de Janeiro, Paracambi, RJ, Brazil.

**** PhD, Public Health Institute, Federal University of Bahia, Salvador, BA, Brazil.

***** PhD, Post-graduate Program on Medicine and Health. Federal University of Bahia and Post-graduation Department, Salvador, BA, Brazil;

Abstract

Objective: To describe the functional impact of chronic low back pain in a population-based sample. Methods: A total of 2,297 individuals aged around ≥ 20 years were selected from 34 regions of Salvador, Bahia, Brazil. In order to characterize samples, sociodemographic data were collected. A body map and the items of the Oswestry questionnaire were used to identify pain location and functional impact. Results: Between 28.6% and 68.8% of the population with CLBP presented disability, depending on the analyzed function. Chronic low back pain was negatively associated with function in lifting objects (rarely, OR 2.39 IC 95%, 1.15-4.97) and remaining seated (OR 10.40 IC 95% 3.32- 32.46). In opposition to that, walking was associated to increased function (frequently, OR 0.47 IC 95% 0.30 – 0,72). Conclusions: Chronic low back pain was frequently associated with disability. Lifting objects and remaining seated were the functional items that presented higher association with disability. Walking habit seems to be a protector for disability in chronic lowe back pain individuals.

Keywords: low back pain, recurrent low back pain, chronic disease, epidemiology, cross-sectional studies, disability

DOI: http://dx.doi.org/10.17267/2317-3386bjmhh.v3i2.663

INTRODUCTION

Low back pain (LBP) is defined as pain, muscular tension or stiffness located bellow the ribs and above the gluteal fold, with or without pain in the lower limbs.[1] Around 80% of the population will experience low back pain at some point in a lifetime; however, it is going to be chronic in just a small group.[2] Chronic low back pain (CLBP) is characterized by persistent pain that lasts for at least 3 months[3,4] and prevalence rate can vary between 10,2% to 31,5% in population studies.[5,6,7] It affects individuals in all ages, but basically in productive phase. It is associated to disability, which is responsible for absenteism from the workplace[8] and for disability justified retirements within productive years[9]. CLBP is one of the most expensive health conditions in industrialized countries and can cost 90.7 billion dollars to the USA's[10] economy and 11 billion pounds to UK's.[8]

Functional disability is one of the main factors associated with CLBP and can affect 60% of studied individuals.[11,12] CLBP associated with mobility limitation and disability to perform daily activities was only surpassed by elderly Rheumatoid Arthritis in Holland.[13] CLBP is the principal factor of year lived with disabilities (YLDs) in developed countries and impacts around 83 million people who live with disabilities, thus justified by great prevalence rates and disability factor associated with health status.[14]

Disability in people with CLBP is a complex, multifactorial, biopsychosocial condition, where the functional status and intensity or frequency of signs and biological symptoms are controversial.[15,16] Several studies were not able yet to establish an association between degenerative alterations of the low back region and painful symptoms and disability in CLBP patients.[17,18]

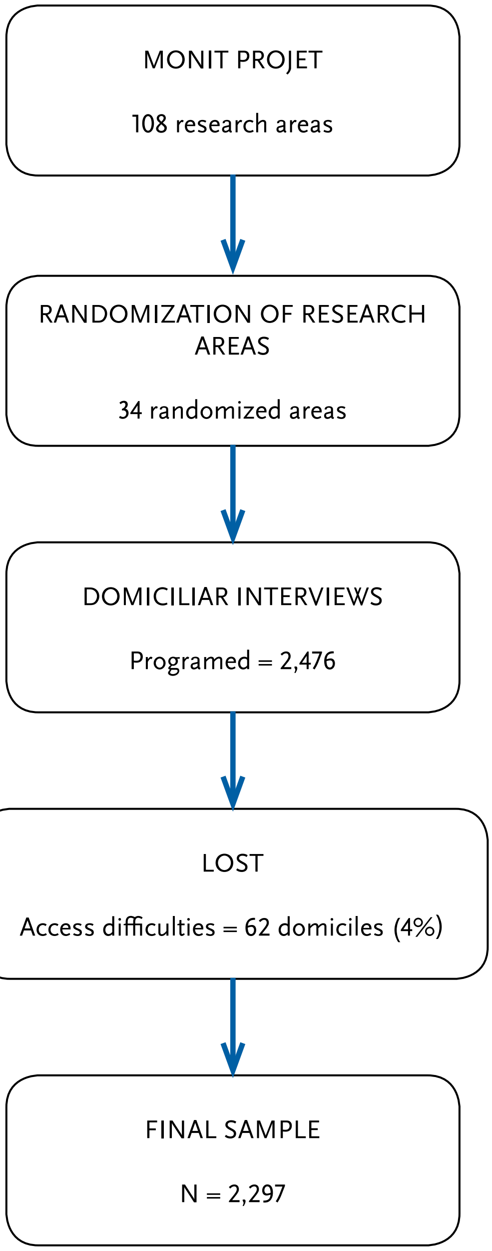
Various studies about CLBP have been carried out predominantly with samples of rehabilitation centers or specific elderly population [4,13,16]. In spite of that, among those studies, populational studies have been a minority. The use of disability global scores by standardized instruments is essential, but the separated items analyses can provide relevant information details about specific functional aspects. Furthermore, functional profile with selected functions and activities may better establish the aforementioned population functional level and guide future health policies and research planning for further scientific investigation.

In spite of the fact that this condition is not associated with mortality, CLPB can cause a disturbing impact on functional ability during the productive years of individuals and that needs a quick response and precise policies to prevent and control its impacts. In order to acquire data on disability in the Brazilian population, the principal objective of this study was to describe the functional profile of the population in Salvador, BA, Brazil suffering from CLBP.

METHODS

Between the years of 1999 and 2000, a project for Monitoring Cardiovascular and Diabetes Mellitus (MONIT) was designed as a cross-sectional study based on population samples. Using probability sampling, 34 out of 108 areas prone to be polled from 10 hydrographic basins were raffled, having sector numbers proportional to socioeconomic status (High, Medium and Low). A total of 16,592 dwells were censed presenting 112,290 inhabitants aged higher or equal 20. The sampling estimate was established observing prevalence of 25% with 95% confidence interval (CI) and 2% error probability, assuming 1,800 individuals to answer investigative questions. The sampling was super estimated to 2,500 adults predicting loss concerning to houses without inhabitants, non-residential buildings, absence due to work trips or not finding after three visits. At the end, a total 1,258 families agreed to participate in the research, so there had been 72 refuses (2,9%) of those chosen on residences reaching a total 2,297 individuals involved. Detailed description of this sampling process is found in Sá et al[19] (Figure 1).

Figure 1 - Fluxogram



After signing free consent form participants answered the previously tested questionnaire. This project was approved by Medical Ethics Committee from the Regional Medicine Council State of Bahia under the number 29.648/99.

The outcome variables were determined as follows: 1) Gender: masculine and feminine; 2) Age: three categories – 20 to 39 years old, 40 to 59, and from 60 years old on; 3) marital status: married, single, divorced/widower; 4) Education: low (functional illiterate – read and write, but never went to school and those who have attended 4 years of elementary school), middle (from 5 to 10 years school) and, high (at least 11 years of school attendance); 5) Social class: according to Brazilian Association of Marketing Research (ABPEME) and then grouped as followed: high (A1+A2+B1), middle (B2+C), and low (D+E); 6) Skin color: white, mulatto, black skin by definition as used officially in the country demographic census; 7) Central Obesity:

considered present if waist measure exceed 84cm for women and 88 for men[20]; 8) Pain Prevalence: acute (less than 6 months), chronic (6 months over) according to International Association for Study of Pain (IASP)[21]; 9) Region of Pain: a body chart was provided so participants could define the region of pain[22]; 10) Disability was recorded: pain harms totally, frequently, some times, rarely and never. In the present study disability refers to any negative impact to corporal functions, individuals' participation on everyday activities[23]; 11) Selected items to describe functional profile: self care, lifting objects, walking, remain seated, remain standing, sleep, have social life and, travel by car.

The independent variable was the presence of CLBP and dependent variables were the functional ability to execute activities and social participation in life. The dependent variables will determine CLBP population prevalence compared to the group without it.

Initially, univariate logistic regression was adjusted to all multivariate considering the level of significance of p<0,10 (OR gross). The selected variables, at this point, were introduced in an only model of multiple logistic regression, and later on the stepwise selection underwent keeping only the significant subjects with p<0,05 at least in one category (adjusted OR). The selected subject was assessed using Hosmer-Lemeshow, graphic analyses of parameters significances. Additionally, multicollinearity was evaluated (VIF- Variance Inflation Factor) and outliers (Bonferroni test with p<0, 01).

RESULTS

The prevalence of CLBP ranged from 11,7% to 18, 9% depending on age. In general prevalence there was no difference between genders. Data referring to demographic characteristics are presented in Table 1.

Table 1 - Characteristics of the Chronic Lower Back Pain population

Characteristics N=337	CLBP† Prevalence N (%)	OR	CI 95%	P value (Gross Analysis)
Gender				
Female	187 (14.7)	0.99	0.79 - 1.26	0.990
Male	150 (14.7)	1.00		
Age				
> 59	36 (18.3)	1.69	1.12 - 2.57	0.013
40-59	198 (16.5)	1.50	1.16 - 1.93	0.002
20-39	103 (11.7)	1.00		
Marital Status				
Divorced /widower	21 (18.9)	1.23	0.75 - 2.02	0.406
Single	82 (11.9)	0.71	0.54 - 0.93	0.014
Married	233 (15,9)	1,00		
Educational Level				
Low	169 (17.4)	1.59	0.87 - 2.90	0.133
Middle	154 (13.0)	1.13	0.62 - 2.06	0.695
High	13 (11.7)	1.00		
Social class				
High	21 (12.5)	0.81	0.50 - 1.31	0.383
Middle	125 (14.9)	0.99	0.77 - 1.26	0.910
Low	187 (15.0)	1.00		
Skin color				
Black	101 (16.5)	1.32	0.96 - 1.80	0.083
Mulatto	146 (14.7)	1.15	0.86 - 1.53	0.342
White	86 (13.1)	1.00		
Central Obesity				
Present	94 (17.7)	1.34	1.03 - 1.74	0.028
Absent	238 (13.8)	1.00		

† Chronic Low Back Pain

The functional profile of CLBP presented in Table 2 demonstrates the negative functional impact on the studied population. After univariate analyses, lifting objects, walking, remaining seated and traveling by car were selected with p<0.10. From these, only traveling by car did not remain as an independent outcome. The adjusted variables walking and remaining seated presented a logical gradient where compared to the category *never*. The other categories have demonstrated to be protective to walk and risk factor to remaining seated. It is highlighted that pain affected all different levels of remaining seated (p<0.05), where total disability is prominent (OR=10.40; CI 95% 3.33-32.46).

Table 2 - Functional profile of population with chronic lower back pain

(continued)

Function N=337	Pain affects	Prevalence† N (%)	OR Gross (CI 95%)	p-value	OR Adjusted (CI 95%)	p-value
Self care				**0.498**		
	Totally	3 (16.7)	0.43 (0.12-1.51)	0.187		
	Frequently	43 (36.4)	1.24 (0.82-1.86)	0.305		
	Some times	53 (31.9)	1.01 (0.71-1.45)	0.948		
	Rarely	10 (29.4)	0.90 (0.42-1.91)	0.782		
	Never	228 (31.7)	1.00			
Lifting objects				0.013		0.057
	Totally	26 (34.2)	1.26 (0.75-2.11)	0.390	1.18 (0.66-2.10)	0.569
	Frequently	84 (36.7)	1.40 (0.99-1.96)	0.053	1.22 (0.81-1.82)	0.340
	Some times	79 (28.9)	0.98 (0.70- 1.37)	0.917	0.82 (0.58-1.18)	0.293
	Rarely	20 (54.1)	2.84(1.44-5.60)	0.003	2.39 (1.15-4.97)	**0.019**
	Never	126 (29.3)	1.00		1.00	
Walking				0.370		**0.007**
	Totally	10 (28.6)	0.87(0.41-1.86)	0.726	0.44 (0.18-1.06)	0.067
	Frequently	59 (29.4)	0,91 (0.63-1.30)	0.593	0.47 (0.30-0.72)	**0.001**
	Some times	93 (33.3)	1.09 (0.80-1.49)	0.581	0.89 (0.63-1.25)	0.490
	Rarely	17 (45.9)	1.86 (0.95-3.64)	0.072	0.91 (0.41-2.00)	0.809
	Never	158 (31.4)	1.00		1.00	
Sitting				<0.001		**<0.001**
	Totally	11 (68.8)	7.15 (2.44-0.96)	<0.001	10.40 (3.33-2.46)	**<0.001**
	Frequently	89 (41.6)	2,32 (1.66-3.24)	<0.001	2.90 (1.97-4.28)	**<0.001**
	Some times	93 (38.3)	2,02 (1.46-2.79)	<0,001	2.35 (1.66-3.34)	**<0.001**
	Rarely	13 (50.0)	3.25 (1.47-7.19)	0.004	2.75 (1.17-6.48)	**0.020**
	Never	131 (23.5)	1.00		1.00	

Table 2 - Functional profile of population with chronic lower back pain

(conclusion)

Function N=337	Pain affects	Prevalence† N (%)	OR Gross (CI 95%)	p-value	OR Adjusted (CI 95%)	p-value
Remaining standing				0.585		
	Totally	12 (28.6)	0.92 (0.46-1.86)	0.828		
	Frequently	101 (32.9)	1.13 (0.83-1.55)	0.433		
	Some times	85 (33.2)	1.15 (0.83-1.60)	0.409		
	Rarely	8 (47.1)	2.06 (0.78-5.45)	0.147		
	Never	131 (30.2)	1.00			
Sleeping				0.868		
	Totally	15 (30.0)	0.88 (0.47-1.64)	0.678		
	Frequently	41 (28.3)	0.81 (0.54-1.20)	0.289		
	Some times	81 (32.1)	0.97 (0.71-1.33)	0.836		
	Rarely	9 (33.3)	1.02 (0.45-2.32)	0.960		
	Never	191 (32.9)	1.00			
Traveling by car				0.064		
	Totally	7 (50.0)	2.37 (0.82-6.84)	0.111		
	Frequently	33 (31.4)	1.09 (0.70-1.69)	0.716		
	Some times	66 (36.7)	1.37 (0.97-1.93)	0.072		
	Rarely	10 (52.6)	2.63 (1.05-6.57)	0.038		
	Never	206 (29.7)	1.00			

$X^2 = 66.883$; gl = 12; $p < 0.001$, †Chronic low back pain prevalence.

The residual analyses did not show violation of presumed models of logistic regression. The variables have not presented significant multicollinearity when measured by VIF (Variance Inflation Factor), once none of them presented value over 10 (lifting objects= 1.07; walking= 1.09; remaining seated=1.06). In terms of discrepant values (outliers), Bonferroni test did not confirm such hypothesis ($p > 0.01$), which permitted the model to involve all the original observations. The final model was adjusted according to Hosmer-Lemeshow statistics ($X^2 = 4.218$; $p=0.754$).

Statistically we have the following estimated function:

$$\ln\left(\frac{\mu}{1-\mu}\right) = -1.10 + 0.17 \times lifObj_T + 0.19 \times LiftObj_F - 0.19 \times LiftObj_{Av} + \\ + 0.87 \times LiftObj_R - 0.82 \times Walking_T - 0.76 \times Walking_F - 0.12 \times Walking_{Av} - \\ - 0.10 \times Walking_R + 2.34 \times \mathrm{Re}\, mainSeat_T + 1.07 \times \mathrm{Re}\, mainSeat_F + \\ + 0.86 \times \mathrm{Re}\, mainSeat_{Av} + 1.010.86 \times \mathrm{Re}\, mainSeat_R$$

DISCUSSION

During the last decades, the association to CLBP with disability has been increasing.[13,14] In Latin America populational studies assessing association between disability and CLBP are rare, probably this current study being the first one to analyze this association in general population. Among various functional aspects studied, only lifting objects, remaining seated and walking were found to be associated with CLBP, which is in accordance to literature.[14,18,25,26] Lifting objects and remaining seated are frequently a problem for people with CLBP, while walking habits seem to be a protector from the symptoms.

Although the majority of people with CLBP reported lifting objects as a rare problem (54.1%), those who considered it as frequent problem (36.7%), or even could not lift objects (34.2%) also influenced the results. These findings suggest that lifting objects may not be a huge problem in CLBP, but it has to be considered when regarding other functional items. Higher values of disability regarding lifting objects were found in literature, ranging from 58% to 60%.[26, 27] Among daily functions, lifting objects was observed by patients with low back pain as the most difficult task to be performed. Differences were not observed between genders.[28] It seems that physical weight is not the principal reason for disability in this activity. Factors such as fear of new lesion, motivation and symptoms exacerbation are related to strong influence in lifting weight tests.[29] However, studies of systematic review could not establish hard physical work as a risk factor for low back pain, pointing the evidences to be conflicting for this association in particular.[30] Therefore, analyzing lifting weight in a population with CLBP should consider factors as physical capacity and psychosocial context of the task.

In populations with CLBP, reports of disability to walk are frequent, varying from 33% to 50%.[25] Our findings show that disability percentage of those questioned with CLBP approaches those found in literature.[27] The ability to walk seemed to be a protector for CLBP. The reduction of gait speed was the principal alteration related in the studies that assessed this function.[31,32,33] Preference for a slow gait was associated to trunk-hip coordination and weak motor control of trunk musculature.[31,32] During a fast gait in patients with discal herniation it was verified synchronism on lower back region and hip rotation, and pendulum movement of the arms, when compared to slower gait. This synchronism allows patients with discal herniation limit their amplitude of spine rotation, thus avoiding potentially painful situations.[33] Gait should be stimulated in patients with CLBP aiming to avoid general deconditioning that immobility or hypomobility can bring. Therapeutic programs that involve walking have been shown as efficient as those of specific exercises to treat CLBP.[34]

Disability to remain seated was somehow present on 68,8% of the population with CLBP. In order to assess causality between working seated and low back pain, Roffey et al,[35] made a systematic review study where this hypothesis was refused. On the contrary to the this finding, keeping static seated posture presented as a provocative factor to low back pain, and remaining seated for one hour was responsible for pain worsening.[36] Young patients with non-specific low back pain reported more intense pain while seated compared to elder patients in the same condition.[37] Low back pain reduces tolerance in remaining seated, leading patients with CLBP to constantly alternate posture, either seated or standing, during different periods of the day.[31] The mechanisms associated to the limitation to remain seated are not still clear, but some factors are frequently mentioned: increase of internal pressure and not enough nourishment of the intervertebral disc (IVD),[36,38] trophic alterations, decreased abdominal musculature activity[39,40] and reduced flexibility in the lower back region.[41] Remaining seated is associated with most of the global population tasks, and related disability seems to be multifactorial in populations with CLBP. Longitudinal studies potentially able to quash confounding variables can bring new knowledge to the theme, so filling out observed blanks of cross-sectional studies.

The other analyzed functional items such as sleep, personal care, remaining standing, social life participation, and traveling by car presented less prevalence in the CLBP population. According to the ICF[23] among those, the only item defined as body function is sleep, the others are considered social activities. Disability related to sleep can affect 51% of the samples studied[42] and, when objective measures are used, this percentages reach 87% in well controlled studies.[43] Data do not exceed 21% when severe disability is the focus of investigation.[44] In the present study around 30% of CLBP population reported some disability to sleep. Although the chronification of pain is set as a mediator of sleep disturbances, Alsaadi et al[42] found prevalence of 63% acute lower back pain (ALBP) and 57% CLBP, thus demonstrating that since the early stage of lower back pain high rates were present hence suggesting other factors, besides pain length, responsible for this outcome. Fatigue, mood disturbances,[45] and even hospitalization due to CLBP are outcomes found in sleep disturbed samples.[46] Sleep alterations affect life quality and prevent adequate rest between work journeys. Therefore, because of these factors this function should receive special attention in further population studies, using objective measure to complement population self reported data.

Personal care, as well as remaining standing are also daily activities assessed in CLBP populations. Moreover, some difficulties as taking a bath, and cutting toenails are reported in community-based studies.[4] In the present study personal care was reported harmful in 36% of the interviewed with CLBP. Remaining standing is frequently associated to physical overweight on lower back region. In the upright position, lower back weight is about 500N,[38] being less than in the seated position. Thus maybe not only the weight, but the exposition period can exacerbate the symptoms. Evidences show that patients reported higher magnitude of low back pain in standing position when degenerative changes of IVD and zygapophyseal joint were present in lower back region.[18] Detailed analyses of tasks and the environment where they are performed can help in a better understanding of these studies in the future, considering the search for autonomy in daily living activities the priority in health planning projects.

Social participation and traveling by car are forms of individual interaction with society, so any level of disability can lead to social isolation and depression. Disability in completely social participation was reported by 27.7% of interviewed with CLBP. Keeping familiar and friendship relationships are social facilitated factors, that is, they can somehow soften disability process.[27] Either social or laboral interaction through car traveling was also prevalent on population of the present study. A longitudinal study in Holland population assessed long exposure to physical weight and demonstrated strong association between inadequate posture and CLBP, which had not occurred between mechanical vibration and CLBP.[47] Bad posture in long trips can generate constant position change necessity, and increase symptom of low back pain. Adequate posture and pauses during trips can diminish traveling by car disability. Transporting people to different places comfortably can be a positive factor to foment social participation.

The self-reported functional compromise reflects the perception of disability extension, making this perception to be influenced by painful experience, sleep alterations, depression level, anxiety or cognitive difficulties. Although these influences are reported in literature, they were not analyzed in the present study and constitute a limitation of this work. Not assessing functional items through a standardized questionnaire was another limitation in this study. In counterpoint, selected functional items allowed us to recognize and discuss specific disabilities and not only total scores.

In conclusion, between 28.6% and 68.8% of the assessed population with CLBP presented disability, depending on the analyzed item. Lifting objects and remaining seated were the functional items that were most associated with disability, and walking remained as a protection from the disability in CLBP. The severe compromise to remaining seated was highlighted in this study results. Other items deserve attention in future studies due to capability to influence population's life quality. Public policies able to quickly respond to population needs, as well as use of clinical guidelines referring to CLBP should be set in different levels of health attention and its results checked from new studies.

ACKNOWLEDGEMENTS

This work was funded by the National Health Council – "Fundação Nacional de Saúde", MS, process No. 25100004122; 98-91 and CNPq process No. 473610; 03-5. The authors declare there is no conflict of interest involved in this manuscript.

REFERENCES

1. Manek NJ, MacGregor AJ. Epidemiology of back disorders: prevalence, risk factors and prognosis. Current Opinion in Rheumatol 2005;17:134-140.
2. Walker B. The prevalence of low back pain: a systematic review of the literature from 1966 to 1998. Journal of Spinal Disorders 2000;13:205-217.
3. Rudy TE, Weiner DK, Lieber SJ, et al. The Impact of chronic low back pain on older adults: A comparative study of patients and controls. Pain 2007;131 (3):293-301.
4. Di Iorio A, et al. From chronic low back pain to disability, a multifactorial mediated pathway: The InCHIANTI study. Spine 2007;32 (26): E809-E815.
5. Freburger JK, et al. The Rising Prevalence of Chronic Low Back Pain. Archieves of Internal Medicine. 2009;169(3):251-258.
6. Cecchi F, et al. Epidemiology of back pain in a representative cohort of Italian persons 65 years of age and Older: The InCHIANTI study. Spine 2006; 31 (10):1149-1155.
7. Maniadakis N, Gray A. The economic burden of back pain in the UK. Pain 2000;84: 95-103.
8. Brage S, Sandanger I, Nygård JF. Emotional distress as a predictor for low back disability: A prospective 12-year population-based study. Spine 2007; 32:269-274.
9. Luo X, Pietrobon R, Sun SX, et al. Estimates and patterns of direct health care expenditures among individuals with back pain in the United States. Spine 2004; 29 (1):79–86.
10. Thomas E, et al. Predicting who develops chronic low back pain in primary care: a prospective study. BMJ 1999;31(8):1662-67.
11. Salvetti MG, et al. Disability related to chronic low back pain. Revista da Escola de Enfermagem [online] 2012; 46:16-23. Available from: http://www.scielo.br/pdf/reeusp/v46nspe/en_03.pdf. Accessed december 20,2012.
12. Puts MTE, Deeg DJH, Hoeymans N, et al. Changes in the prevalence of chronic disease and the association with disability in the older Dutch population between 1987 and 2001. Age and Ageing 2008; 37: 187–193.
13. Vos T, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet 2012; 380: 2163–96.
14. Truchon M. Determinants of chronic disability related to low back pain: Towards an integrative biopsychosocial model. Disability and Rehabilitation 2001; 23: 758 – 767.
15. Lundberg M, Frennered K, Hägg O, et al. The impact of fear-avoidance model variables on disability in patients with specific or nonspecific chronic low back pain. Spine 2011;36:1547–1553.
16. McNee et al. Predictors of long-term pain and disability in patients with low back pain investigated by magnetic resonance imaging: A longitudinal study. BMC Musculoskeletal Disorders 2011, 12:234.
17. Peterson CK, Bolton JE, Wood AR. A cross-sectional study correlating lumbar spine degeneration with disability and pain. Spine 2000;25: 218–223.
18. Sá KN, Baptista AF, Matos MA, Lessa I, et al. Chronic pain and gender in Salvador population, Brazil. Pain 2008;139:498–506.
19. Pitanga FJ, Lessa I. Anthropometric indexes of obesity as an instrument of screening for high coronary risk in adults in the city of Salvador – Bahia. Arq Bras Cardiol 2005;85:26-31.
20. Merskey H, Bodguk N. Classification of chronic pain: description of chronic pain syndromes and

definitions of pain terms. 2º ed.Seattle:IASP Press,1994.

21. Palmer ML, Epler ME. Fundamentos das técnicas de avaliação musculoesquelética. Rio de Janeiro – RJ: Guanabara Koogan, 2000.

22. World Health Organization. International classification of functioning, disability and health: ICF. Geneva: WHO; 2001.

23. Fairbank JC, Pynsent PB. The Oswestry Disability Index. Spine 2000; 25:2940-2953.

24. Bautz-Holter E, et al. Does the International Classification of Functioning, Disability and Health (ICF) core set for low back pain cover the patient´s problems? A cross-sectional content-validity study with a Norwegian population. European Journal of Physical and Rehabilitation Medicine 2008; 44:387-397.

25. Riberto M, et al. A transversal multicenter study assessing functioning, disability and environmental factors with the comprehensive ICF core set for low back pain in Brazil. European Journal of Physical and Rehabilitation Medicine 2012;48.

26. Jonsdottir J, Rainero G, Racca V, et al. Functioning and disability in persons with low back pain. Disability and Rehabilitation, 2010; 32(S1): S78–S84.

27. Kemppi C, Laimi K, Salminen J, et al. Perceived relative importance of pain-related functions among patients with low back pain. Journal of Rehabilitation Medicine 2012; 44: 158–162.

28. Lakke SE, Witttink H, Geertzen JH, et al. Factors that affect functional capacity in patients with musculoskeletal pain: A Delphi study among scientists, clinicians, and patients. Archieves of Physical Medicine and Rehabilitation 2012; 93: 446-57.

29. Bakker EWP, Verhagen AP, Trijiffel E, et al. Spinal mechanical load as a risk factor for low back pain: A systematic review of prospective cohort studies. Spine 2009;34 (8):E281–E293.

30. Spenkelink CD, et al. Assessment of activities of daily living with an ambulatory monitoring system: a comparative study in patients with chronic low back pain and nonsymptomatic controls. Clinical Rehabilitation 2002; 16: 16–26.

31. Lamoth CJC, et al. How do persons with chronic low back pain speed up and slow down? Trunk–pelvis coordination and lumbar erector spinae activity during gait. Gait & Posture 23 (2006) 230–239.

32. Huang YP, Bruijn SM, Lin JH, et al. Gait adaptations in low back pain patients with lumbar disc herniation: trunk coordination and arm swing. European Spine Journal 2011; 20:491–499.

33. Shnayderman I, Katz-Leurer M. An aerobic walking programme versus muscle strengthening programme for chronic low back pain: a randomized controlled trial. Clinical Rehabilitation 2021;27(3): 207–214.

34. Roffey DM, Wai EK, Bishop P, et al. Causal assessment of occupational sitting and low back pain: results of a systematic review. Spine Journal 2010;10 (3):252-261.

35. van Deursen LL, et al. Sitting and low back pain: the positive effect of rotatory dynamic stimuli during prolonged sitting. Eur Spine J 1999; 8 :187–193.

36. Aoki Y, Sugiura S, Nakagawa K, et al. Evaluation of nonspecific low back pain using a new detailed visual analogue scale for patients in motion, standing, and sitting: characterizing nonspecific low back pain in elderly patients. Pain Research and Treatment 2012; Article ID 680496:4.

37. Sato K, Kikuchi S, Yonezawa T. *In Vivo* intradiscal pressure measurement in healthy individuals and in patients with ongoing back problems. Spine 1999; 24 (23):2468–2474.

38. Snijders CJ, et al. Why leg crossing? The influence of common postures on abdominal muscle activity. Spine 1995;20:1989-93.

39. Rasouli O, et al. Ultrasound measurement of deep abdominal muscle activity in sitting positions with different stability levels in subjects with and without chronic low back pain. Manual Therapy. 2011;16:388-93.

40. Sacco et al. The influence of occupation on overall flexibility and lower limb and lumbar range of motion. Revista Brasileira de Cineantropometria e Desempenho Humno 2009;11:51-58.

41. Alsaadi SM, McAuley JH, Hush JM, et al. Erratum to: Prevalence of sleep disturbance in patients with low back pain. European Spine Journal 2012; 21:554–560.

42. O'Donoghue GM, Fox N, Heneghan C, et al. Objective and subjective assessment of sleep in chronic low back pain patients compared with healthy age and gender matched controls: a pilot study. BMC Musculoskeletal Disorders 2009, 10:122.

43. Artner J, Cakir B, Spiekermann J, et al. Prevalence of sleep deprivation in patients with chronic neck and back pain: a retrospective evaluation of 1016 patients. Journal of Pain Research 2013:6.

44. Van Dongen HP, Maislin G, Mullington JM, et al.The cumulative cost of additional wakefulness: dose–response effects on neurobehavioral functions and sleep physiology from chronic sleep restriction and total sleep deprivation. [Erratum appears in Sleep. 2004 Jun 15;27(4):600]. Sleep 2003;26:117–126.

45. Kaila-Kangas L, Kivimäki M, Härma¨ M, et al. Sleep disturbances as predictors of hospitalization for back disorders-a 28-year follow-up of industrial employees. Spine 2006; 31:51-56.

46. van Oostrom SH, Verschuren WMM, de Vet HCV, et al. Longitudinal associations between physical load and chronic low back pain in the general population: The Doetinchem cohort study. Spine 2012; 37 (9):788–796.

47. Jorge LL, Gerard C, Revel M. Evidences of memory dysfunction and maladaptive coping in chronic low back pain and rheumatoid arthritis patients: challenges for rehabilitation. European Journal of Physical and Rehabilitation Medicine 2009;45:469-77.