Factors Associated With Lower Back Pain Among Adult Patients At Selected Health Institutions In Adama Town, Ethiopia

Alem Deksisa, Sileshi Garoma, Worku Dugasa

Department of Public Health, Adama Hospital Medical College,
Adama, Oromia, Ethiopia, PH-+251 091 106 9074
alexdugna@gmail.com

Department of Public Health, Adama Hospital Medical College,
Adama, Oromia, Ethiopia, PH-+251 091 106 9074
garomaabe@gmail.com

Department of Public Health, Adama Hospital Medical College,
Adama, Oromia, Ethiopia, PH-+251 091 106 9074
dugassaworku@gmail.com

Abstract: Background: Lower back pain is a very common health problem worldwide and a major cause of disability - affecting performance at work and general well-being. Lower back pain affects people of all ages, from children to the elderly, and is a very frequent reason for medical consultations. Studying the risk factors for the development of low back pain will help in reducing the occurrence of back pain. The aim of this study is to assess factors associated with lower back pain among clients from selected health institutions in Adama town, Oromia region, Ethiopia, from Feb to March 2018. Methods: A case-control study design was employed. This study was conducted in selected health institutions of Adama town. The sample size comprised 150 cases and 150 controls. Data were collected by trained data collectors using interview-administered questionnaire. The collected data was cleaned and entered into Epi- info version 7, exported and analyzed using SPSS version 20. In the analysis process, the frequency distribution of variables was calculated. Binary logistic regression analysis with odds ratio of 95 % confidence interval was used to assess the association between independent and dependent variables. Independent variables with P _value of <0.25 was considered a candidate for the multiple logistic regression model. Results: A total of 300 respondents were included in this study. The median age of cases was 30 years (Inter-quartile range of 21-39) and, for controls 30 years (Inter-quartile range of 21-38). Respondents categorized in the age group of 15-24 years old were 97% less likely to develop lower back pain (AOR 0.07: 95% CI, 0.01-0.87). The odds of presenting with LBP among patients with BMI score of 20-25 and walking at least 1 day per week for 60 minutes during 5 working days were preventive factors (AOR 0.21: 95% CI, 0.09-0.51) and (AOR 0.18: 95% CI, 0.06-0.59), respectively. Arthritis was a risk factor for Lower Back Pain (AOR 55.79: 95% CI, 21.87-142.31). Conclusions: age group of 15-24, normal BMI, walking at least one day per week for 60 minutes and having arthritis were the independent predictors of Lower Back Pain. The medical workforce and managers should give emphasis to one of the Non-Communicable Diseases, LBP.

Keywords: Adama town, Hospital, Lower back pain, Risk factors

1. Introduction

Lower back pain is defined as pain or discomfort located below the margin of the 12th rib and above the inferior gluteal fold, with or without leg pain [1]. It is estimated that in all populations about 18% of the people will experience low back pain at any given moment [2]. The lifetime prevalence of low back pain in adults is between 65% and 80% [3] Non-communicable diseases, like: heart disease, stroke, hypertension, diabetes, cancer, chronic lung disease, and musculoskeletal disorders, account for most disease burden in third and second world countries, especially those in Asia (4). Chronic diseases caused an estimated 36 million deaths globally in 2008, which represented more than 63% of all worldwide deaths. 90% of these deaths occurred in low- and middle-income countries (5). The effects of chronic diseases are not only on mortality and morbidity, but also present economical and developmental challenges. Chronic diseases affect the most productive years of life. At the family level, chronic diseases cause loss of productivity and income from disability and death and can further compound the extent of poverty due to the high cost of health care (4). The World Bank estimates that; in India, between 4% and 10% of the potential gross domestic product is foregone each year because of chronic diseases. The World Health Organization (WHO) estimates that, in China, lost productivity from chronic diseases may cost the US $550 billion between 2005 and 2015 (6). Lower back pain is a very common health problem worldwide and a major cause of disability - affecting performance at work and general well-being. The 2010 Global Burden of Disease Study estimated that lower back pain is among the top 10 diseases and injuries that account for the highest number of disability-adjusted life years (DALYs) worldwide (7). The lifetime prevalence of non-specific (common) lower back pain is estimated at 60% to 70% in industrialized countries (one-year prevalence 15% to 45%). The prevalence rate for children and adolescents is lower than that seen in adults but is rising (8, 9). Different epidemiological studies estimate, the prevalence of recurrent non-specific low back pain (NSLBP) in teenagers to be between 8% and 36% and link the disease to biological, mechanical, psychological, and lifestyle-related factors [10–19].

2. Materials and Methods

2.1. Study design and setting

A hospital-based case control study design was conducted. The study was conducted in Adama town, which is located

about 99kms east of Addis Ababa (the capital city of Ethiopia). Adama town health institutions serve large size of the population from the Middle East and southern Oromia, Afar, Somali, Southern Nation Nationalities and People (SNNP) and even from some parts of Amhara region. In the town, there are seven health centers and five hospitals (one public and four private). A case-control study was done at the three main teaching hospitals (Adama Hospital Medical College (AHMC), Adama General Hospital Medical College (AGHMC) and the Rift Valley Hospital Medical College (RVHMC)) in the Oromia region of Ethiopia, Adama town. The study was conducted from Feb. to April 2018.

Sample size determination

The sample size was determined using double population formula:

$$n_1 = \frac{\left[Z\frac{\alpha}{2}\sqrt{1+\frac{1}{r}}\frac{1}{p(1-p)} + Z\beta\sqrt{\frac{1}{p_1(1-p_1)}+\frac{1}{rp_2(1-p_2)}}\right]^2}{(INOR)^2}$$

The following assumptions are taken to obtain the maximum sample size

P2= percent of controls exposed (males without LBP) = 54% (20)

If the OR and one of the proportions are known, we can compute the unknown proportion by $p_1 = \frac{p_2}{p_{2+\frac{1-p_2}{OR}}}$

then for $P = \frac{p_1+rp_2}{1+r}$

OR = 2

r= ratio of cases to controls = 1

n1=sample size for cases = 143

Zβ= corresponds to the power of the study

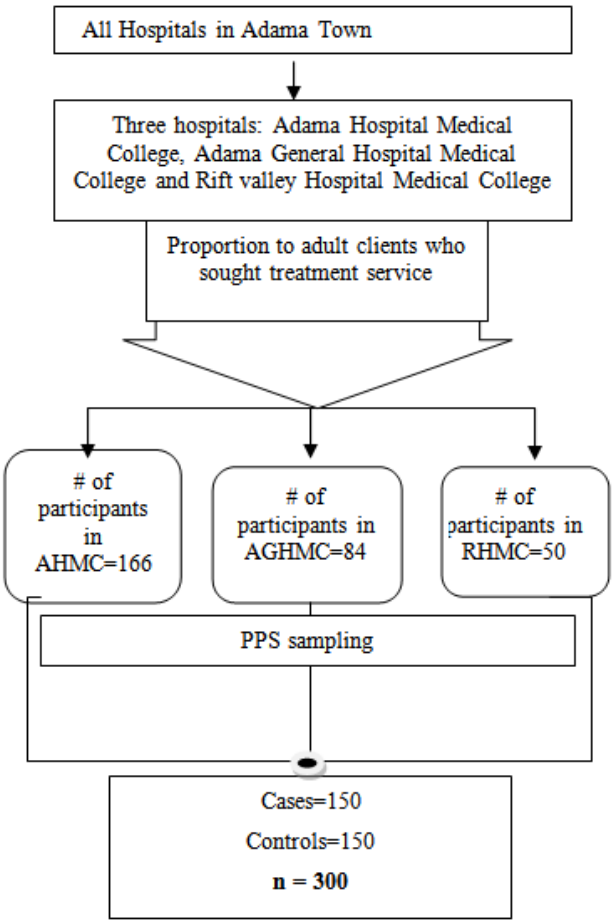
$z^{\alpha}/_2$= corresponds to two-tailed significance level (1.96 for α=0.05)

n2=sample size for controls = 143

Sample size = 286 and 5% non response rate = 300

2.2. Subjects

There are a total of five hospitals in Adama town; from which only three hospitals AHMC, AGHMC, and RVHMC give neurologic and/or physiotherapy services. All these health facilities were included in this study. The flow of patients per day for AHMC on average is one thousand, for AGHMC it is five hundred and for RVHMC it is expected to be three hundred. The selection of samples was done by using a proportional allocation from each health facilities.



NB: AHMC=Adama Hospital Medical College, AGHMC=Adama General Hospital and Medical College, RHMC=Riftvalley Hospital Medical College, PPS=Proportional Probability Sampling

Figure 1: *Schematic presentation of sampling procedures*

2.3. Data collection

A pretested structured interviewer-administered questionnaire was used for collecting information and the questionnaire was adapted from kinds of literature of similar studies. The questionnaire was initially prepared in English and then translated into Afan Oromo and Amharic and later on back to English to check for consistency. The survey was conducted in AHMC, AGHMC, and RVHMC; with six data collectors who are a nurse, professionals were selected and trained on techniques of data collection for one day. For the purpose of supervision, three health professionals were employed and training was given on basic supervisory skills. For the cases, subjects were asked if they had experienced LBP in the preceding three months and the data collection was conducted from Feb 2018 to March 2018.

2.4. Data processing and Analysis

The collected data were coded, cleaned, and entered into Epi info version 7 and exported to Statistical Package for Social Sciences version 20 (SPSS 20) for analysis. Data organization presentation and summarization was done as appropriate to answer the objectives. Independent variables with P _value of <0.25 was considered a candidate for the multiple logistic regression model. Bivariable and multivariable analysis was done using a binary logistic model to estimate the OR at 95%CI. P-value $\leq$ 0.05 was used as cut-off points to declare significance in the final model.

2.5. Ethical approval and consent to participate

Ethical clearance and permission were obtained from Adama Hospital Medical College Ethical Review Board and Permission was secured from Adama town health bureau through a letter written by Adama Hospital Medical College. Informed written consent was obtained from each respondent before the interview. Confidentiality of individual client information was ensured by using unique identifiers for study participants and limiting access to the principal investigator and research assistants of study information.

3. Results

3.1. Socio demographic characteristics of the study participant

A total of 300 respondents were included in this study. One hundred fifty were cases and the remaining 150 were controls. The median age of cases was 30 years (Inter-quartile range of 21-39) and, for controls 30 years (Inter-quartile range of 21-38). The majority of respondents 83 (55.3%) cases and 92 (61.3%) controls were among the age group 25-34. Male respondents were 89 (59.3%) for cases; 79 (52.7%) for controls and by marital status, the majority of the respondents were married 80 (53.3%) for the cases, whereas, single 78 (52%) for the controls. 112 (74.7%) of cases and 118 (78.7%) of controls had followed their education up to tertiary and above. About half of the respondents were orthodox 76 (50.7%) of cases and 84 (56%) of controls. And about 66 (44%) and 57 (38%) were government employee for cases and controls, respectively (Table 1).

3.2. Work-load, physical activities, and co-morbid diseases related factors

Majority of the respondents 134 (89.3%) and 141 (94%) for both cases and controls were not exposed to vibration, respectively. Sitting 5 days/week, at least 60 minutes each day during five working days for cases and controls were 68 (45.3%) and 63 (42%) respectively. During five working days, 126 (84%) cases and 88 (58.7%) controls spent less than 1 day per week on walking. 98 (65.3%) of cases had arthritis, while 139 (92.7%) of controls didn't have arthritis (Table 2).

3.3. Factors associated with LBP

Those variables with P-value<0.25 were exported into a multivariable logistic regression model. Accordingly; age category, body mass index, during five working days; walking at least one day per week for 60 minutes and having arthritis at the time of the survey were the predictors of having lower back pain. Respondents categorized in the age group of 15-24 years old were 93% less likely to develop lower back pain compared to respondents with age > 55 years old, AOR 0.07: 95% CI, 0.01-0.87. The odds of presenting with LBP among patients with BMI score of 20-25 were 79% less than those with BMI score of >25 with 95% CI: (0.09-0.51). Walking at least 1 day per week for 60 minutes during 5 working days was also a preventive factor by 82% for LBP with AOR of 0.18 with 95% CI: 0.06-0.59. Arthritis was a risk factor for Lower Back Pain with AOR of 55.79 with 95% CI 21.87-142.31 (Table 3).

4. DISCUSSION

Factors associated with Lower Back Pain are many and complex. In this matched case-control study, Age category, body mass index, during five working days; walking at least one day per week for 60 minutes and having arthritis at the time of the survey were the predictors of Lower Back Pain. Most factors associated with Lower Back Pain were conducted by cross-sectional study, which has a limitation of statistical power by comparing the groups internally. The presentation of bias in a matched case-control study is fewer than cross-sectional design. A matched case-control study design is expected to produce valid data influencing the reduction of bias among main independent variables. In this finding, patients with an age greater than or equal to 55 years old were a positive risk factor for Lower Back Pain. This finding was also supported by another finding, in which as age increases, individuals were at risk for lower back pain (34), possibly be due to increasing degeneration of the tendons and vertebral bodies resulting from aging. Having a normal body mass index; which is recommended by WHO (18.5-24.9), is important to prevent lower back pain (35). Taller people appear to have more potential risk for disk instability under external loading (34). A meta-analysis including 33 studies showed that obesity was associated with LBP (35). Having a balanced weight and height is believed to reduce the exposure to LBP. This can be due to the mechanical demands resulting from obesity.

Table 1: *Background characteristics of cases and controls, in three selected hospitals in Adama Town, Ethiopia, 2018*

Characteristics		Cases N=150	Controls N=150	p-value
Age category	15-24	11(7.3%)	17 (11.3%)	
	25-34	83 (55.3%)	92 (61.3%)	
	35-44	34 (22.7%)	23 (15.3%)	0.24
	45-54	15 (10.0%)	15 (10.0%)	
	>=55	7 (4.7%)	3 (2.0%)	
Sex	Male	89 (59.3%)	79 (52.7%)	0.30
	Female	61(40.7%)	71(47.3%)	
Marital status	Single	65 (43.3%)	78 (52.0%)	
	Married	80 (53.3%)	67 (44.7%)	0.40
	Divorced	2 (1.3%)	3 (2.0%)	
	Widowed	3 (2.0%)	2 (1.3%)	
Level of education	Illiterate	5 (3.3%)	1 (0.7%)	
	Read and write	7 (4.7%)	3 (2.0%)	
	Primary	4 (2.7%)	7 (4.7%)	0.28
	Secondary	22 (14.7%)	21(14.0%)	
	Tertiary and above	112 (74.7%)	118 (78.7%)	
Religion	Orthodox	76 (50.7%)	84 (56.0%)	
	Muslim	42 (28.0%)	34 (22.7%)	
	Catholic	3 (2.0%)	5 (3.3%)	0.80
	Protestant	28 (18.7%)	26 (17.3%)	
	Other	1(0.7%)	1 (0.7%)	
Occupation	Jobless	3 (2.0%)	2 (1.3%)	
	Daily laborer	4 (2.7%)	4 (2.7%)	
	Government employee	66 (44.0%)	57 (38.0%)	
	Merchant	8 (5.3%)	12 (8.0%)	
	Farmer	6 (4.0%)	4 (2.7%)	0.23
	Driver	7 (4.7%)	6 (4.0%)	
	Housewife	7 (4.7%)	1 (0.7%)	
	Student	7 (4.7%)	15 (10.0%)	
	Other	42 (28.0%)	49 (32.7%)	
Work experience	<5	51 (42.5%)	62(48.4%)	0.35
	>=5	69 (57.5%)	66 (51.6%)	
Monthly income	<5000	86 (57.3%)	95 (63.3%)	0.29
	>=5000	64 (42.7%)	55 (36.7%)	
BMI	<20	19(12.7%)	7 (4.7%)	
	20-25	87 (58%)	119 (79.3%)	0.0001
	>25	44 (29.3%)	24 (16%)	
No exercise	No	40 (26.7%)	55 (36.7%)	0.07
	Yes	2 (1.3%)	5 (3.3%)	
Walking	At least 3xper week,30mins @ a time	20 (13.3%)	16 (10.7%)	0.09
	<3, but at least 1x per week, 30mins per day	18 (12.0%)	32 (21.3%)	
	<1x per week	112 (74.7%)	102 (68.0%)	
Running	At least 3xper week,30mins @ a time	12 (8.0%)	8 (5.3%)	0.07
	<3, but at least 1x per week, 30mins per day	11 (7.3%)	17 (11.3%)	
	<1x per week	27 (18.0%)	42 (28.0%)	
Swimming	At least 3xper week,30mins @ a time	10 (6.7%)	2 (1.3%)	0.01
	<3, but at least 1x per week, 30mins per day	6 (4.0%)	12 (8.0%)	
	<1x per week	30 (20.0%)	45 (30.0%)	
Others	No	111 (74.0%)	108 (72.0%)	0.70
Smoking	No	141 (94.0%)	146 (97.3%)	0.16
	Yes	9 (6.0%)	4 (2.7%)	
Alcohol consumption	No	101(67.3%)	94 (62.7%)	0.40
	Yes	49 (32.7%)	56 (37.3%)	

Table 2: *work-load, activity and health-related characteristics of cases and controls, in three selected hospitals in Adama Town, Ethiopia, 2018*

Characteristics		Cases N=150	Controls N=150	p-value
Exposure to vibration	No	134 (89.3%)	141 (94.0%)	0.41
	yes, on average <2hrs/day	4 2.7% ()	1 (0.7%)	
	yes, on av. 2-6hrs/day	7 (4.7%)	4 (2.7%)	
	yes, on av. >6hrs/day	5 (3.3%)	4 (2.7%)	
The frequency of sitting per week	5 days/week, at least 60mins each day	68 (45.3%)	63 (42.0%)	0.82
	<5,but at least 1day/week; at least 60m/day	29 (19.3%)	28 (18.7%)	
	<1day/week	51 (34.0%)	55 (36.7%)	
The frequency of standing per week	5 days/week, at least 60mins each day	6 (4.0%)	10 (6.7%)	0.62
	<5,but at least 1day/week; at least 60m/day	26 (17.3%)	31 (20.7%)	
	<1day/week	80 (53.3%)	73 (48.7%)	
The frequency of walking per week	5 days/week, at least 60mins each day	10 (6.7%)	23 (15.3%)	0.0001
	<5,but at least 1day/week; at least 60m/day	12 (8.0%)	32 (21.3%)	
	<1day/week	126 (84.0%)	88 (58.7%)	
Lifting heavy objects	Yes	17 (11.3%)	12 (8.0%)	0.33
	No	133 (88.7%)	138 (92.0%)	
If yes, weight of 10kg	yes,<1x/hr	3 (2.0%)	2 (1.3%)	0.76
	yes,1-12x/hr	12 (8.0%)	8 (5.3%)	
	yes,>12x/hr	2 (1.3%)	1 (0.7%)	
	No	2 (1.3%)	1 (0.7%)	
A frequency of pushing and/or pulling per hour	No	136 (90.7%)	131 (87.3%)	0.36
	yes,<1x/hr	13 (8.7%)	15 (10.0%)	
	yes,1x/hr or more	1 (0.7%)	4 (2.7%)	
Hypertension /high blood pressure	No	134 (89.3%)	125 (83.3%)	0.13
	Yes	16 (10.7%)	25 (16.7%)	
Diabetes/sugar problems	No	137 (91.3%)	133 (88.7%)	0.44
	Yes	13 (8.7%)	17 (11.3%)	
Arthritis	No	139 (92.7%)	52 (34.7%)	0.0001
	Yes	11 (7.3%)	98 (65.3%)	
Other	No	150 (100.0%)	149 (99.3%)	0.32
	Yes	0 (0.0%)	1(0.7%)	

In this study walking at least 1 day per week for 60 minutes during 5 working days had a significant protective effect on lower back pain ($p<0.001$). According to, a study done in Sri Lanka, taking part in exercises: such as walking and running more than three times a week had a significant protective effect on lower back pain. Physical exercise has consistent evidence for primary prevention of lower back pain compared to no activity [45]. Physical activity (exercise) did show a protective role in many studies (36, 40, and 41). Our research showed that a patient with arthritis increased the development of lower back pain; which is similar to the study done in Denmark [14]. Similar findings were also observed in Tunisia and South Africa that, comorbid diseases like arthritis, were associated with lower back pain [36, 38]. It was also similar to a study done among Adama Hospital Medical College staff that, arthritis was a risk factor for LBP (21). This is because; Arthritis has a degenerative effect on the spinal joints.

Limitation of the study

This study has limitations. In this research, we focused on a relatively small number of risk factors for the development of lower back pain. This may introduce bias in the statistical analysis. Lower back pain defined in this study doesn't provide information on pain intensity and pain interference, both of which may be more important than simply the presence of lower back pain. It is difficult to distinguish cause from effect and there might be also a recall bias.

5. CONCLUSION AND RECOMMENDATIONS

Risk factors for Lower Back Pain are many and complex. In this matched case-control study, Age category, body mass index, during five working days; walking at least one day per week for 60 minutes and having arthritis at the time of the survey were the predictors of Lower Back Pain. The medical workforce and managers should give emphasis to one of the most Non-Communicable Diseases, LBP. Hospitals and health care providers need to give attention to aged, obese and physically inactive patients for the prevention and control of lower back pain. These findings have important implications for the development of health education or health promotion on back care. Further prospective studies on the influencing factors of LBP are required.

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7. Authors' Contributions

Alem Deksisa Abebe (MPH, Lecturer): Design and conception of the study, wrote the proposal, supervised the conduct of the study, analyzed the data and finalized the manuscript

Sileshi Garoma (PhD, Associate Professor) and Worku Dugasa (MPH, Assistant Professor): assisted the study design and proposal writing, supervised the conduct of the study, data analysis and reviewed the manuscript

Competing interests

We declare no conflicts of interest.

Consent for publication

Not applicable.

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Author Profile

Alem Deksisa received BSc in Physiotherapy from University of Gondar in 2006 and received BA in Sociology and Social Work from Adama Science and Technology University in 2012. During 2006-2015, I had been working as a physical therapist and department head in Physiotherapy Unit of Adama Hospital Medical College, Adama, Ethiopia. I took MPH in Public Health from Joint Addis Continental Institute of Public Health and Adama Science and Technology University in 2015. From 2015 todate, I am a Lecturer at Adama Hospital Medical College, Department of Public Health, Adama, Ethiopia.