

PREVALENCE AND DETERMINANTS OF LOW BACK PAIN AMONG LECTURERS: A QUANTITATIVE APPROACH

ABSTRACT

Introduction: Lower back pain is one of the most common work-related problems among teaching professionals in both developed and developing nations and it often leads to absenteeism or early retirement of workers. Thus the aim of this study was to investigate the prevalence and associated risk factors of low back pain among academic staff.

Method: An institutional based cross-sectional study was adopted. Five faculties were randomly selected in Ekiti State University, Nigeria and a self-structured questionnaire was purposively administered; depending on interest and availability of the respondents. The data was explored and Chi-square analysis alongside binary logistic regression was applied in order to evaluate the relationship between low back pain and some associated factors. Analysis was carried out in SPSS version 20.

Results: This study comprises 127 lecturers with a mean age of (41.95±9.42). There were more males (55.9%) than females. More than thirty six percent of the lecturers had teaching experience below 5 years while 44.9% had 5 to 10 years and 18.9% had above 10 years of teaching experience. The results show that age, gender, prolong sitting and prolong standing significantly (p-value <.05) associated with occurrence of low back pain among lecturers while mixed teaching posture serve as a protective against low back pain.

Conclusion: The results reveal a very high prevalence of low back pain. Findings show that female gender, old age and inappropriate work postures are risk factors of low back pain. It is suggested that effort should be to ameliorate occupational stress among academic staff.

Keywords: lecturers, logistic regression, low back pain, prevalence, prolong sitting.

I. Introduction

Pain is an unpleasant state felt in the mind but perceivable as arising in a part of the body while back pain is any pain felt in the human back that may come from the muscles, bones, nerves, joint or any other structure in the spine. The pain may be constant or intermittent, stay in one place or refer or radiate to other areas. It may be a dull ache or a sharp or burning sensation. Low back pain (LBP), more accurately called lumbago or lumbo sacral Pain, occurs below the 12th rib and above the buttocks. It is one of the most prevalent musculoskeletal conditions and a common cause of disability in both developed and developing countries [1]. A meta-analysis conducted elsewhere on LBP shows that it is more prevalent among adult than the younger ones and among females than males [2, 3]. Various works show that lifetime prevalence of LBP is very high even in developed countries. Meanwhile, it incurs billions of dollars in medical expenditures each year [3]. Africa is not spared as the prevalence is also increasing at alarming rate. About 46% was reported for out-patients in a particular hospital, western part of Nigeria [4] while higher proportions have also reported across different countries and professions [5, 6, 7, 8, 9]. Meanwhile, various risk factors have been noted and among them are smoking, anxiety or depression and lack of support at work, and psychosocial factors are also of concern. [8] categorized the risk factors for LBP into individual, physical and psychosocial factors. The individual factors include variations like age and gender. Though, LBP is highly prevalent among both genders [6]. Age is regarded as a constant contributing factor to LBP among societies. It is considered that as long as the population is ageing, the global population of people with lower

44 back pain would tend to increase substantially [2]. Physical activities that are also peculiar with
 45 lecturers such as prolonged standing during lecture, weakness of the lower limbs due to
 46 awkward posture and sitting for long periods mostly with computer contribute significantly to
 47 sustaining LBP. Majority of the members within the active population are more affected by LBP
 48 due to the deterioration of disc bones. [2] Emphasizes people with lower back pain stand a
 49 higher chance of missing work, among different working age groups, including teachers or
 50 lecturers. Globally, 37% of LBP are attributed to occupational hazard related causes [10]. It is
 51 therefore noted that the risk of getting LBP could be higher in workers who do heavy physical
 52 work which may be common among those working in laboratory, or whose posture is awkward
 53 during work.

54 It is obvious that the work of lecturers are not only limited to class work, but that the occupation
 55 involves holding as well as body movements such as frequent bending, twisting, sudden
 56 movement, and working in bent-over postures: these are almost unavoidable while reading or
 57 preparing note or during field work and they are found to have a significant potential for
 58 producing lower back pain. According to [11], workers involved in high energy activities such as
 59 gymnastics and sports activities at school are at higher risk of developing a more chronic LBP
 60 injury, which often result in permanent disability hence untimely retirement. More so, a study
 61 conducted among Irish identified musculoskeletal problems, including LBP, as one of the
 62 leading causes of ill health cause-specific retirement among lecturers [7]. Despite this, extensive
 63 investigation into school environment with regard to general working atmosphere and likely
 64 causative factors for LBP is more than necessary. Hence, recommendation sequel to our
 65 findings could be invaluable to policy makers and lecturers in particular. Therefore, this study
 66 aims at determining the prevalence as well as the major risk factors associated with low back
 67 pain among lecturers in Ekiti State University, Nigeria.

68 II. Methodology

69 Sample

70 In this cross sectional study, five faculties were randomly selected out of eleven within Ekiti
 71 State University, Ado-Ekiti campus. The University is structured into 11 Faculties, three of which
 72 are embedded in College of Medicine (Faculties of Basic Medical Sciences, Basic Clinical
 73 Sciences and Clinical Sciences). Others are: Agricultural Sciences, Arts, Education,
 74 Engineering, Law, Management Sciences, Science and the Social Sciences. The data collection
 75 took place between January 2017 and March 2017. Due to an envisaged difficulty in accessing
 76 some of our potential respondents, a required and optimum sample size was estimated thus:

77 The target population as found in the school website was 555; the sample size estimated is
 78 given below:

79
$$n = \frac{n_0}{1 + \frac{1}{N}(n_0 - 1)} \dots\dots\dots (i)$$

80
$$And \ n_0 = \frac{Z\alpha^2 P(1-P)}{d^2} \dots\dots\dots (ii)$$

81 Where 'n', 'n₀', 'N', 'Z_α', 'P' and 'd' are: the required sample size, the optimum sample size,
 82 target population, the standard variate at α level of significance, P is the prevalence of low back
 83 pain (worst case scenario due to irregular reports in the literature) and d is the precision

84 Z= 1.96, d= 10%= 0.1, p=50%=0.5, N=555

85 Therefore $n_0 = \frac{Z\alpha^2 P(1-P)}{d^2} = 97$ & $n = \frac{n_0}{1 + \frac{1}{N}(n_0 - 1)} = 82$

86 **Inclusion Criteria**

- 87 • Lecturers that are permanently employed in the University.
- 88 • Lecturers with a work experience of at least 6 months.
- 89 • Lecturers who consented to the understanding of the research.

90 **Exclusion Criteria**

- 91 • Lecturers with a history of LBP due to trauma such as road accidents.
- 92 • Lecturer with recent surgical operation.
- 93 • Pregnant women

95 **Measurements**

96 Primary data used in this research was obtained from a well-developed self-administered
 97 questionnaire. The questionnaire was designed to collect information on individual demographic
 98 data (Age, gender, working experience, sex and so on), work conditions (duration of
 99 employment in current work, average working hours per day, and so on), it also comprises
 100 questions that assess the functional disability of a client which are: sitting, standing, walking and
 101 lifting. Each of the four sections had five questions.

102 **Logistic Regression Model**

103 The response variable is: ever experience low back pain in the last six months, denoted by Y.
 104 The variable is a dichotomous with options either 'Yes' or 'No', assigned with probability $\pi_i =$
 105 $P(Y_i = 1|X)$ or $P(Y_i = 0|X)$ respectively. The logistic regression is given by:

106
$$\pi_i = \frac{e^{\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip}}}{1 + e^{\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip}}} \dots \dots \dots (iii)$$

107 And can be equivalently expressed with logit link function as:

108
$$\log it(\pi_i) = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip} \dots \dots \dots (iv)$$

109 Where $i=1,2,3,\dots,n$, $j = 1, 2, \dots, p$ and x_{ij} are the predictors, β_0 is an intercept and β_j 's are the
 110 coefficients of the predictor variables

111 **Estimation of the parameters**

112 The likelihood of an individual/participant experience LBP can be likened to a likelihood function
 113 $L(Y|X,\beta)$ which can be defined as the joint probability distribution $f(y|X,\beta)$ of the respective
 114 independent observation vector of size n with regression parameter β and design matrix X. This
 115 can be expressed mathematically as:

116
$$L(Y | X, \beta) = \prod_{i=1}^n \left(\frac{e^{\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip}}}{1 + e^{\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip}}} \right)^{y_i} \left(\frac{e^{\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip}}}{1 + e^{\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip}}} \right)^{1 - y_i} \dots \dots \dots (v)$$

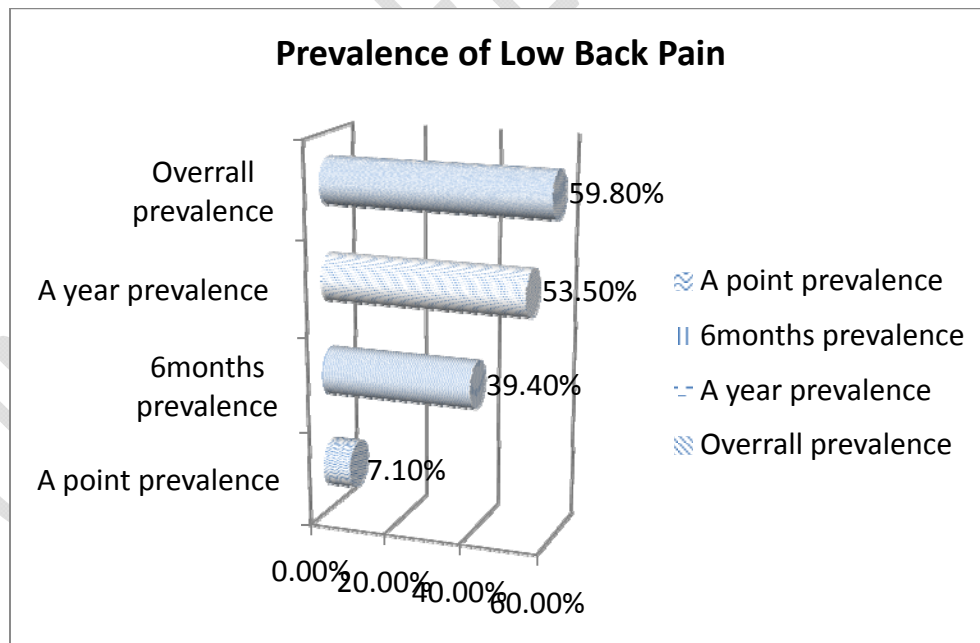
117 It signifies how likely an individual observed LBP prior to the study time given the parameters.
118 The parameters estimation is based on maximum likelihood method, with Newton-Rapson
119 iterative search algorithm to maximize the likelihood function or its logarithmic transformation.
120 Luckily, this procedure is machine driven that can be found in most statistical packages such as
121 SPSS we applied in this work.

122 Data Analysis

123 Completed data was captured on a spreadsheet using the Microsoft Excel program in
124 preparation for analysis. The data was recoded from question responses into meaningful
125 prevalence variable. Thereafter, data was transferred into the Statistical Package for the Social
126 Sciences (SPSS) IBM Version 20. Descriptive statistics were employed to summarize the
127 demographic data of the study sample and presented using frequency tables and express as
128 percentages, means and standard deviations. Chi-square was applied to determine if any
129 association exists between categories of low back pain and physical activities as well as the
130 demographic variables. All tests were done at 5% level of significance except during preliminary
131 analysis where 10% for variable selection. However, logistic regression was used to determine
132 the predictors' relationship with low back pain. The choice of this model was based on the fact
133 that the dependent variable is dichotomous and measured independently.

134 III. Results

135 Displayed in figure 1 are the categories of prevalence of LBP in the results. About 7% (n=127)
136 revealed to be having symptoms of low back pain as at the point of interview. Fifty (39.4%)
137 indicated to have had the experience within the last six months to the time of investigation and a
138 year prevalence of 53.50% was similarly estimated. Meanwhile, 76 participants, representing
139 59.8%, had had low back pain at a time in their life as revealed in the result.



140
141 **Figure 1.** Various episodes of low back pain among lecturers
142

143 **TABLE 1:** DISTRIBUTION OF SOCIO-DEMOGRAPHIC CHARACTERISTICS (n=127)

VARIABLES	FREQUENCY	PERCENTAGE (%)
Gender		
Male	71	55.9
Female	56	44.1
Age		
20-29	14	11.0
30-39	38	29.9
40-49	43	33.9
50 and above	32	25.2
Marital Status		
Single	27	20.3
Married	100	78.7
Working Experience		
Below 5 years	46	36.2
5 – 10 years	57	44.9
10 years and above	24	18.9
Academic Qualification		
BSC	6	4.7
MSC	68	53.5
PHD	53	41.7
Average class taught per day		
Below 3classes	93	73.2
3 or above	34	26.8
Working posture		
Often sitting	25	19.7
Often standing	102	80.3

144 A total number of 200 questionnaires were administered within the selected faculties with an
145 attrition rate of 36.5% due to the usual hectic nature of the job of our target population. Average
146 age of the study group was (41.95±9.42) and among the 127 Lecturers that responded and met
147 the inclusion criteria, 56 (44.1%) were females and 71(55.9%) were males. Majority were
148 identified to have married (n=100; 78.7%) and 43 (33.9%) were in the age group 40 - 49 years.
149 Also, a notable proportion (n = 68; 53.5%) possessed second degree (MSc). More than thirty six
150 percent of the lecturers had teaching experience below 5 years while 44.9% had teaching
151 experience between 5 and 10 years inclusively and 18.9% had above 10 years of teaching
152 experience. About a quarter taught more than 2classes per day. With regards to their posture,
153 many of the respondents preferred to stand while teaching.

154 In order to streamline the variables to be recruited into the logistic model, a Univariate Chi –
 155 square test was conducted at 10% level of significance. The results show that age, gender,
 156 years of work experience together with other physical musculoskeletal activities are associated
 157 with occurrence of low back pain.

158 **Table 2:** Multiple Logistic Regression of Low Back Pain and Its Associated Factors

	B	S.E.	Wald	df	P- Value	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
sex(male)	-.714	.446	2.562	1	.109	.490	.204	1.174
Age	2.053	.849	5.843	1	.016	7.788	1.474	41.142
Work experience (in years)	1.480	.651	5.160	1	.023	4.391	1.225	15.740
Prolong Sitting	1.133	.481	5.544	1	.019	3.105	1.825	5.283
Prolong Standing	1.487	.742	4.012	1	.045	4.424	2.053	5.827
Walking ≤ 1km per day	.371	.688	.290	1	.590	1.449	.376	5.580
Heavy weight lifting	.632	.464	1.852	1	.174	1.881	.757	4.675
Teaching posture (Sitting)	- 1.381	.704	3.851	1	.049	.251	.063	.998
Constant	2.671	2.706	.974	1	.324	14.447		

159 Multiple logistic regression was applied to jointly evaluate the influence of sex, age and job
 160 related factors. The model explained about 49% of the variances in ever experience LBP in the
 161 last 12months among the participants and 81% of the cases were correctly classified. Table2
 162 shows the relationship between low back pain and some potential risk factors among
 163 respondents. After adjusting for other variables, a unit increase in age increases the odds of
 164 experiencing LBP by 7.788(P=.016). Similarly, a unit increase in lecturing years of experience,
 165 prolong standing, as well as prolong sitting consequently increase the odds of having a low back
 166 pain by 4.391 (P= .023), 3.105 (P= .019) and 4.424 (P= .045) respectively. Elevated
 167 occurrence of LBP is also observed among respondents who arbitrarily stand throughout lecture
 168 without creating an interlude for few minutes sitting. This category of lecturers are found to be
 169 3.98(1/0.251, P=.049) times likely to experience LBP than their counterparts that intermittently
 170 sit during lectures, holding all other independent variables in the model constant. Influence of
 171 gender, indulgence in daily exercise like some minutes' walk, and heavy weight lifting on LBP
 172 could not be substantiated statistically at 5% level of significance.

173 **IV. Discussion**

174 This study investigated the prevalence of low back pain and its associated risk factor among
 175 lecturers. Different categories were considered depending on the retrospective time frame. That
 176 is, a-point, six months, a year and a life-time prevalent. However, the current study pivots a year
 177 prevalence as an indicator for comparison. It is evident that the prevalence is strikingly high
 178 among the respondents. Actually, a relatively high prevalence has been reported in other
 179 related studies especially among primary health care visitors [6] and teachers [5, 7]. These

180 findings are similar to other studies carried out in Africa as well as in high income countries
181 particularly among nurses and in general population. For instance, [12] reported 45.6%
182 prevalence of lower back pain among teaching staff in a research conducted in China while
183 another study showed that 55.7% of Botswana school teaching staff [8]. The researchers
184 concluded that LBP is rising and is becoming a general concern for occupational health. [3]
185 carried out a systematic review about low back pain prevalence in Africa and the result showed
186 that a year prevalence of low back pain was 67%. A study on the prevalence of LBP among
187 nurses in Nigeria identified a significantly high incidence of LBP (73.53%) amongst nurses
188 working in a typical Nigerian specialized hospital [9]. In contrast, lower prevalence had been
189 reported elsewhere [2, 13, and 14]. The situation in Malaysia is no different to that of Turkey [13]
190 reported a 40.4% prevalence of LBP among teaching staff. Although prevalence of low back
191 pain among lecturers in Africa has not been widely explored, results of the few available studies
192 including the current results show that it is high. Lecturers in other developed countries may be
193 working under improved condition which is most likely not the case under which lecturers in
194 most African countries practice. Therefore, lecturers in Africa, particularly in Nigeria where the
195 study was conducted might be at higher risk of suffering from low back pain than those in other
196 developed countries a need for review of scoping strategy. The results of this current study will
197 hopefully contribute to the scanty information available in Africa. Moreover, in line with the
198 current study, literature reveals that LBP is more prevalent among females than their
199 counterparts [2, 5, 6, 8 and 13]. The cause of this variation may be related to disparity in body
200 chemistry as women tend to have a lower pray threshold than men and other predisposing
201 factors other than work-related variables considered in this study. Increase in LBP with age was
202 observed in this study. This is tandem with the findings in some studies [7] meanwhile it was
203 elevated among the middle age (35-44years) in another setting [15]. Perhaps, the unusual hike
204 within this age group could be a result of physical hitches rather than age. The odds ratio shows
205 that occurrence of LBP increases with years of working experience. This receives a boost from
206 a previous study conducted in Egypt [14]. Moreover, there is virtually a correlational interplay
207 between age and work experience which might be responsible for the relationship. Lecturers job
208 include reading, writing, marking and working with computer. These occupational postures may
209 lead to prolong sitting which may contribute to experience of low back pain. Our findings shows
210 that LBP increases with prolong sitting just like the report from a similar research among
211 teachers in Malaysia [5, 13]. Prolong standing also reflect a congruent effect as those that stand
212 longer at work tend to surfer LBP more. This posture is common among lecturers particularly
213 the junior ones who frequently indulge in activities like sustained standing when teaching and it
214 could post a lot of challenges like LBP. Unfortunately, most schools in this part of the world lack
215 the facilities that could aid preferred postures of lecturers. Other classroom posture that shows
216 a significant relationship with low back pain is mixed teaching posture. It has shown intermittent
217 sitting while teaching is protective against low back pain. We suggest that this habit should be
218 encouraged as much as possible.

219

220

V. Conclusion

221 This study showed that a point prevalence of low back pain is 7.1% and a year prevalence is
222 53.5% among the lecturers. It affects female lecturers than their male counterparts. Low back
223 pain was found to increase with age, work experience, prolong sitting and prolong standing.
224 Often sitting for some minutes during played a protective role against LBP. A risk as this is a
225 pointer that lecturers are also exposed to occupational hazard since LBP could contribute to
226 early retirement.

227

228 **Conflict of interest**

229 Authors have no conflict of interest

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