

Transactional Analysis of Low Back Pain and its Associated Risk Factors among Public Market Vendors in Batangas City

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Abstract – Low Back Pain (LBP) brought by multifactorial causes, is one of the major and most expensive debilitating conditions' worldwide however, there are limited studies regarding the association of its risk factors in the Philippines particularly in Batangas City. Using purposive sampling, a total of 285 male and female participants, ages 18 years and above were included in the study. Participants experiencing LBP was assessed using Oswestry Disability Index (ODI), International Physical Activity Questionnaire (IPAQ), and Visual Analog Scale (VAS). Results showed that the onset of LBP occurs mostly among females aged 18-35 years old, married, high-school graduates, with normal BMI, and staying in cold environment. Health status in association with disability was significant in developing LBP among public market vendors. Significant findings (p -value <0.05) were associated with pre-existing LBP, trunk rotation, carrying loads, sadness, fear and squatting. Further study is recommended using greater population

Keywords – Transactional Analysis, Market Vendors, Low Back Pain, Risk Factor

INTRODUCTION

Low Back Pain (LBP) is one of the major [1] and most expensive [2] conditions worldwide. LBP is multifactorial [3] and could include psychological, musculoskeletal, neurological, social, and environmental factors [4]-[5], and can vary depending on the specific type of work individuals are engaged in [6] LBP causes impairments [1] which can affect the performance of the Basic Activities of Daily Living (BADLs) and Instrumental Activities of Daily Living (IADLs) [6]. These difficulties could limit their participation not only in the community but also in their different fields of work as well [7].

LBP can also affect public market vendors that could be explained using the International Classification of Function, Disability, and Health (ICF) which comprises of health condition, impairment, participation restriction, personal and environmental factor. ICF focuses on three perspectives namely: the body, individual, and society [8] which also coincide

with the Transactional Model of Human factors which include the person, task, and environment [9].

These perspectives underscore the importance of the interplay and influence of both internal and external factors to each individual's health condition [10]. The risk factors of LBP for "Person" include the individual's gender wherein males are more prone to experience LBP than females [11]. However, in other studies, females show more predominance than males [12];[5]. Another factor is the age which ranges from 40-80 years old [1], low educational attainment [13] [15], obesity using the Body Mass Index [14] smoking and alcohol drinking [15], prolonged sitting [15]; [17] and lastly, depression or depressive disorder [14];[16]. Risk factors under "Task" includes physical activity [15];[13] duration of work [17], and amount of carrying loads [18]. Lastly, for the "Environment" the risk factor is temperature [19].

Some studies showed prevalence of LBP and its associated risk factors among Western Countries particularly among workers in United States [7]. However, there are no studies regarding its associated

risk factors in the Philippines particularly in Batangas City. The objectives of this study are to determine the distribution of the respondents in terms of their profile, analyze the association of LBP with its associated risk factors, and to provide plan of action towards the said condition. The results of this study will help increase the awareness of public market vendors regarding LBP and will serve as baseline data for the Batangas local government in establishing a healthcare plan.

MATERIALS AND METHODS

Research Design

A cross-sectional design was used to analyze LBP and its risk factors among vendors in Batangas City public markets.

Participants

This study was conducted in Batangas City Public Markets I, II and III. The study utilized purposive sampling. A total of 285 vendors were included. Participants were either male or female. Inclusion criteria include individuals whose age ranges from 18 years old and above, works at least 8 hours a day, presence of low back pain and knows how to read and write. Market vendors who have other jobs (e.g. porter or market owner), with uncontrolled heart problems, with neurological conditions, part-time vendors, and pregnant women were excluded in the study.

Screening Tool

I. Demographic Questionnaire.

It is a questionnaire which assesses the occurrence of LBP as well as its associated risk factors. It is divided into two parts namely; personal information and health information. Questionnaires were translated in Tagalog for better comprehension of the target population. Trial run was conducted in Sto. Tomas, Batangas public market for face validation.

Assessment tool

I. **Oswestry Low Back Pain Disability Questionnaire (ODI).** It is a 10-item questionnaire which assess the severity of current LBP. It has an excellent item reliability of 1. A total score of 0-20% entails minimal disability, 21-40% is moderate disability, 41-60% is severe disability, and 61-80% is crippled. This tool was also translated in

Tagalog version to make it more appropriate for the target population.

II. **International Physical Activity Questionnaire (IPAQ).**

A questionnaire which aimed to know the activities done by the participants for the past seven (7) days. This consists of 5 activity domains namely job-related physical activity; transportation physical activity; housework, house maintenance, and caring for family; recreation, sport, and leisure-time physical activity; and time spent sitting. It has a criterion validity of 0.30. Scoring shows that >3000METs means high activity, >600METs and <3000 METs means moderate activity.

III. **Visual Analog Scale (VAS).**

This was utilized to know the environmental temperature. A scale of 10cm was drawn starting from 0 to 10. A scale of 0-1 means very cold, 1.5-2.5 means cold, 3-4 means slightly cold, 4.5-5.5 means neutral heat, 6-7 means hot, 7.5-8.5 means tolerable heat, and 9-10 means very hot.

Procedure

Prior to the actual conduct of the study, a trial run was administered by the researchers in Sto. Tomas Batangas public market. The trial run utilized a total of 300 participants. Some of them do not have existing low back pain but were also included for validation purposes. After the revision of the questionnaires, the actual implementation started. The screening was conducted in a rowdy environment and within the participants' convenient time. Those who passed the screening were given an informed consent written in English and Tagalog. The Demographic Questionnaire, ODI, IPAQ, and VAS were also given. All data were gathered, tallied, and tabulated.

Statistical Stool

Descriptive Analysis was used to get the frequency of respondents' age, civil status, gender, educational attainment, BMI, risk factors, VAS, and ODI. In analyzing the association of LBP and its risk factors with ODI, Chi-square was used. All data gathered were subjected to IBM SPSS ver. 23.

Ethical Consideration

The protocol was approved by Lyceum of the Philippines University Batangas – Research Ethics Review Committee including the informed consent, questionnaires, screening and assessment tools. All the data were treated with confidentiality.

Limitations of the study

The limitations of the study include the following: (1) the data that were gathered were purely subjective; (2) the scope of population were limited; (3) confounding variable such as arrival of consumers and the attention span of market vendors were not eliminated; (4) specific type of goods that they sell; (5) inability to add the ratio (numerical values) on the risk factors; and lastly, (6) the study used general low back pain regardless of the cause.

RESULTS AND DISCUSSION

Table 1
Distribution of the Respondents in terms of Profile

Profile	Variables	Frequency	Percentage
Age	18-35	143	50.2
	36-55	92	32.3
	above 55	50	17.5
Civil status	Widow	13	4.6
	Single	83	29.1
	Married	189	66.4
Gender	Male	140	49.1
	Female	145	50.9
Educational attainment	Elementary	77	27
	High School	176	61.8
	College	32	11.2
Total		285	100

Table 1 shows the distribution of respondents in terms of profile. Most of the participants were females, 18-35 years old, married, and high school graduates. This implies that most vendors are young to middle-aged adults who are engaged in vigorous tasks related to their work thus, become more prone to micro-traumas in the body causing pain. This is supported by Hoy et al. [1] wherein middle-aged individuals are at greater risk in having LBP brought by their productive years. Furthermore, according to Feldman, et al. [20] LBP is common in adolescents which is contributed by high growth spurt, poor quadriceps and hamstring flexibility. Married persons tend to require repeated activities such as lifting, repeated bending and trunk

rotation. They are also required to carry their children on top of their work. They are more prone to do heavy loads and work to sustain the needs of the family. Married individuals also has increased responsibility and psychosocial stressors that could predispose them to acquire LBP [21]. With regards to gender, most of the respondents are females. Since females undergo menopausal stage leading to estrogen deficiency, they are usually exposed to different musculoskeletal degenerative diseases including LBP. Presence of LBP in females is associated with combination of biopsychosocial mechanisms such as susceptibility and tolerance to acquire pain and habitual and sensitive perception of pain [5] Females are also more likely to acquire bone diseases such as osteoporosis, osteopenia and osteoarthritis which can be a factor in developing LBP. On the contrary, males are said to be more susceptible to acquire LBP due to vigorous activities as compared to females [11]. In terms of educational attainment, majority of the respondents are high school graduates. Individuals with higher educational attainment have better self-control and balanced lifestyle and thus high-school graduates tend to have lower self-control. Also, increase demand of activity is also rampant in this group that increases predisposition in acquiring LBP. This is contrary to the study by Lionel [15], wherein market vendors with low educational level (elementary) have more chance of experiencing LBP since they exhibit less sense of personal control than those with a college degree or higher levels of education.

Table 2
Distribution of the Respondents in terms of Body Mass Index (BMI)

BMI	Frequency	Percentage
Underweight	9	3.2
Normal Range	178	62.5
Overweight-At Risk	63	22.1
Moderately Obese	24	8.4
Severely Obese	11	3.9
Total	285	100

Table 2 presents the distribution of respondents in terms of body mass index (BMI). Based on the result, majority of the participants have normal range of BMI. Despite having a normal BMI, they do not engage in any physical exercise, proper body mechanics and they often engage in prolonged sitting and squatting which also predisposes them in having LBP. This is contrary

to Shemory et al. [14] and Lionel [15] wherein significant correlation between obesity and LBP (body mass index, >30 kg/m²) was found due to atherosclerosis which eventually leads to disc degeneration, an important cause of LBP.

Table 3 shows the health status of the respondents in terms of the risk factors. Among the identified risk factors, alcohol showed the highest frequency followed by smoking. This means that majority of the vendors having LBP are alcoholic and smoker. Alcohol causes

Table 3
Health Status of the Respondents in terms of the Risk Factors

Status	Frequency	Percentage
Smoking	113	39.6
Alcohol	140	49.1
Trauma	29	10.2
Cancer	0	0
Bone	35	12.3
Nerve	0	0
Hamstring tightness	84	29.5
TOTAL	285	100

the body to leech the calcium from the bones that could cause osteoporosis predisposing them to acquire LBP. Smoking may also damage structures of the lower back possibly due to higher proteolytic activities. This is supported by the study of Lionel [15] wherein alcohol intake could be correlated with obesity that eventually could lead to disc degeneration. This is also supported by Elmasry, et al [22] which states that smoking play a significant role in IVD degeneration.

Table 4 presents the distribution of the respondents using visual analog scale (VAS) which measure the thermal perception on the vendors' environment. This means that majority of the vendors are staying in a cold environment. Cold weather causes the muscles, tendons, and ligaments to tighten that could strain the structures surrounding the spine and pull the sensitive nerves causing pain. This is supported by the study of Ye et al., [19] where cold conditions result in a higher muscular load.

Table 5 presents the distribution of respondents using Oswestry Disability Index (ODI). Based on the result, it was found out that majority of the respondents experienced moderate disability. This implies that they experienced more pain and difficulty with sitting, lifting and standing.

Table 4
Distribution of the Respondents using Visual Analog Scale (VAS)

VAS	Frequency	Percentage
Very Cold	33	11.6
Cold	93	32.6
Slightly Cold	37	13.0
Neutral Heat	32	11.2
Hot	31	10.9
Tolerable Heat	55	19.3
Very Hot	4	1.4
Total	285	100

Travel and social life are more difficult and they may be disabled from work. Personal care, sexual activity and sleeping are not grossly affected and the individual can usually be managed by conservative means. The result can be attributed to the fact that market vendors commonly force themselves to lift different commodities for their income. It is part of their routine and daily activity.

Table 5
Distribution of the Respondents using Oswestry Disability Index (ODI)

ODI	Frequency	Percentage
Minimal Disability	8	2.8
Moderate Disability	197	69.1
Severe Disability	62	21.8
Crippled	17	6.0
Bed Bound	1	0.4
Total	285	100

In addition, they often take a rest, sit, and stand and flex their body in uncomfortable way due to the limited space on their store. This causes the occurrence of mild chronic joints and muscle pains which may lead to more serious physical problem since the symptoms occur dramatically which are sometimes ignored by vendors. These are debilitating, painful conditions affecting muscles, tendons, tendon sheaths and nerves. Moderate disability could also be due to the micro-trauma of the spine on top of the reduced tolerance. However, severe disability to bedbound could be due to exaggeration of symptoms thus resulting to suggestions of a health check-up. As stated in Lionel [15], sitting posture increases strain on the posterior elements of lumbar spine which may lead to the development of LBP.

Table 6 presents the association between the respondent's profile and Oswestry Disability Index (ODI). Using a p-value of <0.05, all variables such as age, civil status, gender, and age were not significant.

This implies that the profile of respondents have no relationship to their experiences as to intensity of pain, lifting, ability to care for oneself, ability to walk, ability to sit, sexual function, ability to stand, social life, sleep quality, and ability to travel. The findings of this study is in contrast with [23]. in which gender and low educational attainment were significant in association with the severity of LBP which could be due to greater sensitization as to pain and more frequent and strenuous outdoor household activities.

Table 6
Association between the Respondents' Profile and ODI

Variables	p-values	Computed values	Verbal Interpretation
Age	.73	5.22	Not Significant
Civil status	.27	14.42	Not Significant
Gender	.495	3.39	Not Significant
Educational attainment	.73	5.27	Not Significant

Significant level at P <0.05

Table 7 presents the association between the risk factors and ODI. Using a p-value of <0.05, all associated risk factors such as BMI, smoking, alcohol, trauma, cancer, bone, nerve, hamstrings, and VAS were not significant. Non-significance could be attributed to the prior results wherein the normal range was the predominating BMI. Other risk factors such as trauma, bone, and hamstring tightness could be due to increase tolerance to pain. Severity of LBP does not increase despite having a normal BMI, being an alcoholic drinker nor a smoker. This is contrary to the study of Shemory et al., [14] wherein obesity, smoking, and alcohol were found to be significant however, there were no further explanations provided.

Table 7
Association between the Risk Factors and ODI

Risk Factors	p-values	Computed values	Verbal Interpretation
BMI	.85	10.24	Not Significant
Smoking	.53	3.16	Not Significant
Alcohol	.31	4.79	Not Significant
Trauma	.11	7.51	Not Significant
Cancer	*		
Bone	.28	5.12	Not Significant
Nerve	*		
Hamstring	.10	7.75	Not Significant
VAS	.82	17.57	Not Significant

*No Statistics are computed since cancer and nerve are constant
Significant level at P <0.05

Table 8
Association between the Health Status and ODI

Health Status	p-values	Computed values	Verbal Interpretation
Present Low Back Pain	*		
Prior existence of low back pain	.000	33.82	Significant
Pain upon sitting	.056	9.22	Not Significant
Trunk Rotation	.028	10.866	Significant
Carrying Loads	.043	9.88	Significant
Sadness	.007	14.058	Significant
Fear	.002	17.21	Significant
Exercise	.195	6.06	Not Significant
Cold Weather	.369	4.28	Not Significant
Hot Weather	.568	2.937	Not Significant
Standing	.12	7.24	Not Significant
Lying	.16	6.51	Not Significant
Squatting	.02	11.999	Significant
Sitting	.598	2.77	Not Significant

*No Statistics are computed since cancer and nerve are constant
Significant level at P <0.05

Table 8 shows the association between the health status and ODI. Using a p-value of <0.05, prior existence of LBP, trunk rotation, carrying loads, sadness, fear, and squatting were found significant. This means that these risk factors can enhance the severity of LBP. Presence of an existing LBP affects the integrity of the anatomical structure of spine and its surrounding structures through micro-trauma. Movements of the spine particularly the trunk rotation could cause impingement of the nerve roots that could also cause compression of several structures of the vertebra. Majority of the Instrumental Activities of Daily Living (IADLs) of vendors require carrying different loads that adds pressure on the spine. People tend to alter their body into a comfortable position when predisposed to sadness and fear. The usual alteration is to be in a fetal position wherein the cervical, thoracic, and lumbar spine is flexed with both shoulders in protraction thus, promoting stress on the structures of the lower back. With improper squatting position, the trunk would acquire stress. All of these predispose an individual to have LBP with greater severity. According to Shemory et al. [14], depressive disorders such as dysthymia, major depressive disorder, endogenous depression, recurrent depression, manic depressive psychosis, atypical depressive disorder, and reactive depressive psychosis were found to be statistically correlated in acquiring LBP. Furthermore, according to Ozguler et al. [18], carrying loads greater than 10kg can lead to LBP. On the other hand, it is said that carrying loads weighing 10lbs in a squatting position for more than 4 hours per day or more than twice per minute with a total of 2 hours per day would cause LBP [17]. Another factor that may produce pain

on the low back is prolonged twisting of trunk which may damage the structures of neck or low back [19].

Table 9
Association between the Alcohol Intake and Presence of Current and Pre-Existing Low Back Pain

Health Status	p-values	Computed values	Verbal Interpretation
Present Low Back Pain	*		
Prior Existence of Low Back Pain	.929	.008	Not Significant

*No Statistics are computed since cancer and nerve are constant
Significant level at P <0.05

Table 9 shows the association between the alcohol intake and presence of current and pre-existing LBP. Using a p-value of <0.05, there was no association between the alcohol intake of the respondents with present and pre-existing LBP. This implies that the alcohol intake is not significantly related to the occurrence of LBP. Alcohol causes disturbance in calcium absorption that cause brittle bones and would later develop LBP. This is contrary to the study of Lionel [15] wherein alcohol intake could be correlated with obesity that eventually could lead to disc degeneration. Remaining individual studies tended to report no statistical significant association.

Table 10
Association between the ODI and IPAQ

Variables	p-value	Computed value	Verbal Interpretation
ODI and IPAQ	.817	1.554	Not Significant

Significant level at P <0.05

Table 10 presents the association between the ODI and International Physical Activity Questionnaire (IPAQ). This shows that ODI and IPAQ were found not to be significant. This explains that high physical activity has nothing to do with the pain intensity or level of disability of the vendors. These physical activities were not associated with the severity of LBP possibly due to compensatory strategies of the individuals such as travelling by walking instead of using vehicle. The findings is in contrast with the study of Altug et al. [24] which mentioned that IPAQ was significant with pain intensity at activity however, no explanation was further given.

CONCLUSION AND RECOMMENDATION

This study shows that pre-existing LBP, trunk rotation, carrying loads, sadness, fear, and squatting are personal factors that are associated with the severity of LBP. The researchers recommend to (1) carry-out the proposed plan of action based on the findings of the study.

PROPOSED PLAN OF ACTION			
OBJECTIVES	ACTIVITIES	DURATION	PERSON RESPONSIBLE
To provide awareness of LBP and its associated risk factors to the public market vendors	Conduct stall-by-stall discussion and giving of flyers regarding LBP	1 month	Physical Therapists in coordination with Barangay Health Workers
	Monitor effectiveness using feedback session		
To lessen the significant risk factors in acquiring LBP	Conduct stall-by-stall teaching of proper body mechanics and ergonomics with flyers	2 months	Physical Therapists in coordination with Barangay Health Workers
	Assess the impact of proper body mechanics and ergonomics in terms of work productivity		

Addition of other objective measurements such as muscle lengthening; use other parametric statistical tool such as Pearson rho for other variables such as weight of carrying loads and duration of sitting, trunk rotation, and squatting; conduct future studies focusing only on one of the following variables namely: females, low educational attainment, alcoholics, experiencing moderate disability in ODI, exposed to cold weather, with pre-existing LBP, trunk rotation, carrying loads, sadness, fear, and squatting; focus on a specific LBP; and use other working populations.

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