Occupational Health and Issues in The Low Back Pain Among Filipino – Aged People Through Ordinal Logistic Regression

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Abstract

Low back pain (LBP) is one of the health problems among the elderly's in the Philippines such as functional mobility, daily living activities, sleep quality, psychological symptoms and reduced health-related quality of life. Different research survey questions were used to determine the factors affecting the lower back pain of the elderly Filipinos. The aim to help the elderly, researchers identified several factors that greatly contribute to having low back pain (LBP). The researchers used the tool Minitab 18 to get the desired results of the gathered data, the statistical tool to analyze data's relationship to other variables, the reliability of the dependent variable to the factors. The data was analyzed through ordinal logistic regression through normality test. Data gathered showed a normal distribution with a p-value of 0.057. According to the analysis, the sleep disorder is most likely the main predictor affecting the lower back part of the elderly body. The recommendations provided to this study is to help elderly people to keep a good physical health condition, sleep quality improvement and having a regular daily exercise also, things to avoid to reduce the risk of having low back pain.

Keywords
Low back pain, Ergonomics, Special population, Ordinal logistic regression, Sleep disorder

1. Introduction

In the Philippines, the Commission on Population (POPCOM) states that in the year 2017, the aging population (ages 60 and above) is forecasted to be steadily increasing by (0.23%) or almost eight million elderly Filipinos by the year 2018 (ABS-CBN News, 2018). As people get old, there will be an increase of low back pain (LBP) complaints leading to nerve damage, work disability, depression and insomnia resulting to a range in medical cost of PhP 21,197.00 to PhP 103,225.00 per visit. Additionally, it is the fifth most frequent causes with an account of approximately three percent (3%) of the patients are referred to the emergency department (ED) (Jorgensen, 2007). According to the medical data provided in a healthcare facility in the Philippines, inactive lifestyle, overweight, incorrect posture, traumatic injuries, smoking, and muscle strains greatly contributes to the existence of low back pain among the elderly patients.

In addition, low back pain (LBP) shows to be a major health problem among the aging people because of its high prevalence and adverse effects on functional mobility, daily living activities, sleep quality, psychological symptoms and reduced health-related quality of life. Elderly people with low back pain (LBP) experiences adversity in mending the pain that causes them to limit their movement. Moreover, pain control is one of the many complications in the elderly, by many unresolved problems (e.g., difficulty of diagnosis, substantial lack of clinical studies, and a total lack

of safe and effective therapies) (Hasselström et al, 2002 & Molton et al, 2014) Base on Global pain index (GPI) report in the year 2017, Body pain is prevalent in many counties including the Philippines by fifty-six percent (56%) suffer from body pain on a weekly basis and the most common experience of body pain are, back by thirty percent (30%) and lower back by twenty eight percent (28%) (Boros, 2018). The purpose of this study is to determine the occurrence of low back pain (LBP) in order to identify the significant factors that result to a limited movement among elderly people due to uncontrollable pain (eg. sprain, spasm or strain and irritation etc.). Also, there are several types of pain allied with low back pain (LBP) such as discogenic pain, radicular pain, facet-joint pain, sacroiliac pain, and muscular pain (Beukes, 2012). As this study focuses on the factors most affected by pain in the physical, psychological, and self-reported complaints. To know more about (assessment of pain intensity, quality of life and any physical disability pain) as it permits further knowledge on low back pain (LBP) that may contribute the improvement of the society.

In order to solve the problem, it is applicable to assess the risk factors in order to enhance the current lifestyle of elderly in the Philippines and to recommend an ergonomic solution to reduce the low back pain (LBP) that results to functional mobility among elderly people. Facility layout will not be tackled out in this study since this study limits its focus on the risk factors that will be found out for improvement of the daily activities which is intended for the elderly in the Philippines. Data samples were gathered at home for the aged facility under the government of the Philippines
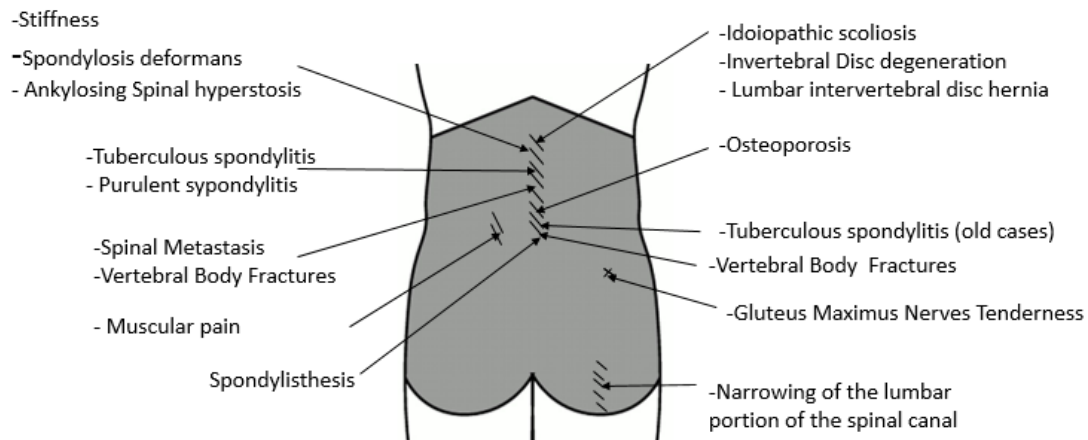

Figure 1. Effects in the lower back part of the body

The Figure above shows different types of pain affecting the lower back part of the body. Low back pain (LBP) results in many effects which would cause immobility or more serious cases. Low back pain (LBP) may also result to congenital abnormalities, degenerative disc disease, osteoarthritis, rheumatoid arthritis, post-herpetic neuralgia, vertebrae fractures secondary to osteoporosis, spinal disc rupture or herniation, spinal stenosis, bone mass, spondylitis, and infection osteomyelitis (Alpert, 2014) .

2. Literature Review

Lower back pain (LBP) is a major health difficulty elderly are encountered not only because it is frequent to the elderly people, but also because of the potential factors that contribute in having lower back pain (LBP). Also, age is a well-known risk factor in low back pain (Kim et al, 2014). As people get older the chances of having low back pain (LBP) also increases (Palacios-Ceña et al, 2015, Williams et al, 2015 & Jiménez-Sánchez et al, 2012). Moreover, in the case of elderly, reports from the study shows 12.3% of the men and 24.2% of women had suffered LBP (Jiménez-Sánchez et al, 2012), but different types and amount of activities are to be considered, moderate or vigorous activity heighten the risk of LBP regardless their age and gender (Kim et al, 2014 & Kanis, 1992). As the body mass index (BMI) increases has a higher risk of low back pain (LBP) (Kim et al, 2014). Studies showed a link to low back pain (LBP) with smoking and increased body mass index (Seaman, 2013 12& Nilsen et al, 2011). Smoking has a high risk of low back pain (LBP) which affects the risk of lumbar disc herniation will increase for past smokers compared with never smokers (Leino-Arjas, 1998 & Jhawar et al, 2006). Consumption of alcohol is most likely associated with low back pain (Shearer, 2016).

Furthermore, due to physical function, psychological function, or other aspects of quality of life, it is a risk factor for persistent or debilitating among elderly people (Geriatr, 2002). Sitting for long a time or wrong posture will lead to low back pain. (Power et al, 2001). As it follows to a long time in standing damages and affects the lower back part of the body (Deyo et al, 1989). Also, the sleep disorder is a frequent health problem which is also related to low back pain (LBP) (Kaila-Kangas et al, 2006). A study also shown from a large diverse sample of patients with low back pain (LBP) revealed that 59% of patients stated lack of sleep (Alsaadi et al, 2001). Likewise, depression is a condition which a person feels very sad, hopeless, and unimportance leads to low back pain, people with severe depression actually feel pain more intensely than others (Pinheiro et al, 2015). Low back pain (LBP) is the most common musculoskeletal complaint requiring medical attention; it is the fifth most common reason for all physician visits (Jiménez-Sánchez et al, 2012 & Kanis, 1992). Fatigue is also one of the health complains that involves low back pain (LBP) which defines cognitive difficulties, tiredness and sleepiness, reduced strength and endurance, and loss of interest and motivation (Lewis et al, 1992 & Morriss et al, 1998). Two studies have shown that low back pain (LBP) patients caused by fatigue (Fishbain et al, 2004 & Feuerstein et al, 1987). Locus of control is determined by health care professionals, found to be related to a higher risk of low back pain (LBP). (Koleck et al 2006 & Haldorsen et al, 1998). As for the environment, wind speed and wind gust speed increase the risk of low back pain (LBP) (Steffens et al, 2014).

The figure below is the conceptual framework constructed using the accumulated related literature and studies. Low back pain (LBP) is the dependent variable and individual factors, work conditions, psychological factors, and environmental factors affect the low back pain.
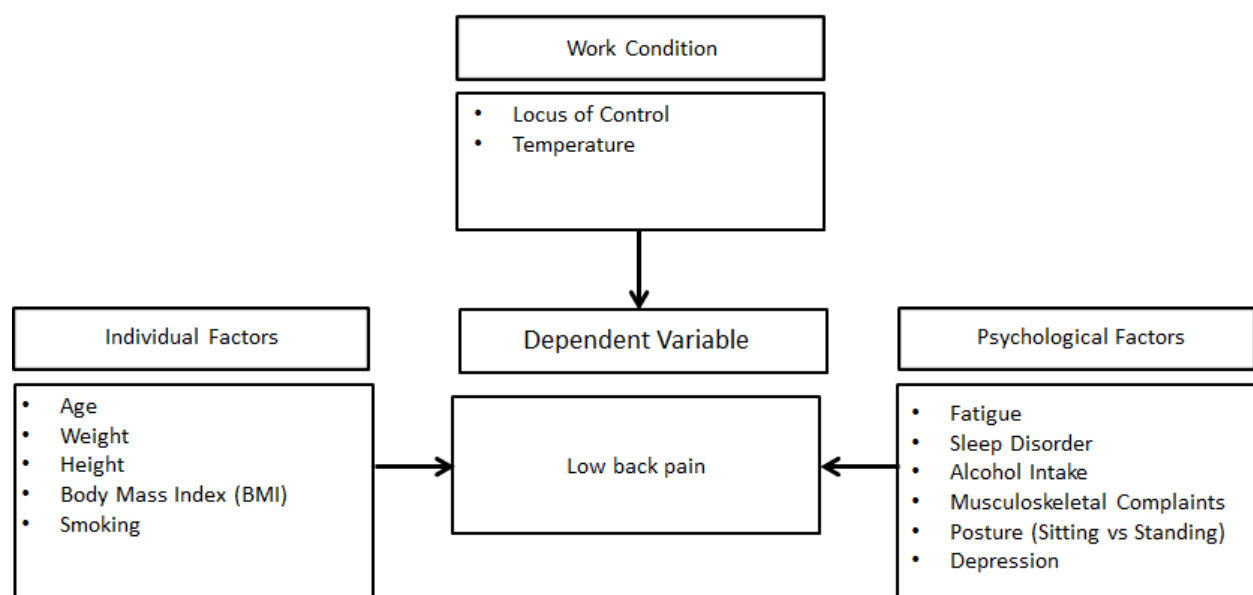

Figure 2. Conceptual Framework

A. Individual Factors

Individual factors are related to the basic information associated with elderly Filipinos with low back pain (LBP). It mainly includes age, weight, height, and body-mass index of elderly Filipinos. These set factors have a direct effect on low back pain (LBP) assessed using a socio-demographic questionnaire that shows the characteristic of elderly Filipinos.

B. Psychological Factors

Psychological factors represent the mental disability such as fatigue, sleep disorder, musculoskeletal complaints, posture (sitting and standing), alcohol intake and depression of elderly Filipinos that experience low back pain (LBP). These set of variables assessed the mental health condition of elderly Filipinos.

C. Work Condition

Work condition variable is related to locus of control, it is defined as the individual's perception of which is responsible for their life condition. Low back pain (LBP) has a higher risk in the external locus of control that has poor verbal usage and needs greater life quality. It would relate to heat, humidity, or even barometric pressure that makes a difference on pain levels. This variable is related to the aspects of environmental. This to see the degree of sensible heat or cold as it measures a scale that would see a quantitative data in terms of degree.

3. Research Design and Methodology

3.1 Sampling Frame

The researchers used a random sampling as a condition for Filipino elderly who are experiencing low back pain (LBP) which cause limited movements. An alpha level of 0.05 is used. Which most used in most social science education research studies (Bartlett et al, 2001). Also, the researchers used a 5-point scale standard deviation to capture 98% of the respondents. The researchers made use of the following parameters to determine the sample size who will participate in the study.

where:

n_0 = is the sample size
t = selected alpha level value for two-tailed test = 1.96
p, q = estimate of variance = 0.5
d = estimated acceptable margin of error for categorical data = 0.05
      *the value for (d) is the percent error the researcher is willing to accept

$$n_0 = \frac{(t^2)x(p)(q)}{(d)^2} \qquad (1)$$

$$n_0 = \frac{(1.96)^2 x(0.5)(0.5)}{(0.05)^2} = \textbf{384 samples}$$

Cochran's Formula was used to determine the sample size using the categorical data. To determine an acceptable sample size which can estimate the result of the whole population with a good accuracy. To generalize the large samples this would reduce into a smaller population.

$$n_1 = \frac{n_0}{(1 + \frac{n_0}{Population})} \qquad (2)$$

Wherein:
n1 = corrected minimum sample size

$$n_1 = \frac{384}{(1 + \frac{388}{36})} = 32.6 \approx \textbf{33 Respondents}$$

After solving the sample size Cochran (1997) sample size determination to obtain an appropriate data sample in a large population which can reduce the sample to a smaller population that provides more information in the study. The researchers identified the accurate respondents. Base on the results of the researchers the total respondents are 33 elderly.

The table below was used by researchers as a sample of individuals to collect accurate data using a quantitative measurement. Using the following variables the individuals were chosen to a random sampling between the ages of 60-80 years old. Also, body mass index (BMI), smoking and drinking were used as quantitative measurements.

Table 1. Summary of Demographics

Demographics	Frequency	Percentage
Gender		
Male	10	30.30
Female	23	69.70
Age		
60-65 y/o	12	36.36
66-70 y/o	15	45.46
71-75 y/o	5	15.15
76-80 y/o	1	3.03
BMI		
Underweight	7	21
Normal	17	52
Overweight	8	24
Obese	1	3
Smoking	0	0
Drinking	0	0

3.2 Data Collection

The researcher used a qualitative approach (a systematic, subjective approach used in describing and explaining the relationship between variables in the literature in a form of survey questionnaire) was created and utilized in obtaining the data from Filipino-aged in the Philippines. In order to perceive the problem in low back pain (LBP), initial surveys are used. Bournemouth Questionnaire (BQ) is asses the dependent variable that measures a numerical rating scale (NRS) representing the pain of the respondent. Fatigue assessment scale (FAS) the impact on the respondent's diseases. Örebro Musculoskeletal Pain Questionnaire (ÖMPQ) assesses the risk that a respondent will develop a long-term disability. Oswestry Low Back Pain Disability Questionnaire measures the respondent's permanent functional disability. Locus of Control Questionnaire measures generalized expectancies for internal versus external control of the respondents. Beck Depression Inventory (BDI) measures characteristic attitudes and symptoms of depression. Heat index measures the amount of moisture in the air that affects the skin of a person. Socio-demographic are general questions of the characteristics of the respondents. Pittsburgh Sleep Quality Index (PSQI) measures the quality and patterns of respondents. Assessed of the respondent to 33 elderly's who experience low back pain (LBP). The conceptual framework by gathering the respondents of the observed problem, essential data was needed, therefore; Cochran's Formula was used to determine the sample size of the respondents. The sample size attained at 33 respondents. The data collected requires a good summarization, interpretation, analyzing to be able to get the best possible conclusion and recommendation to the study.
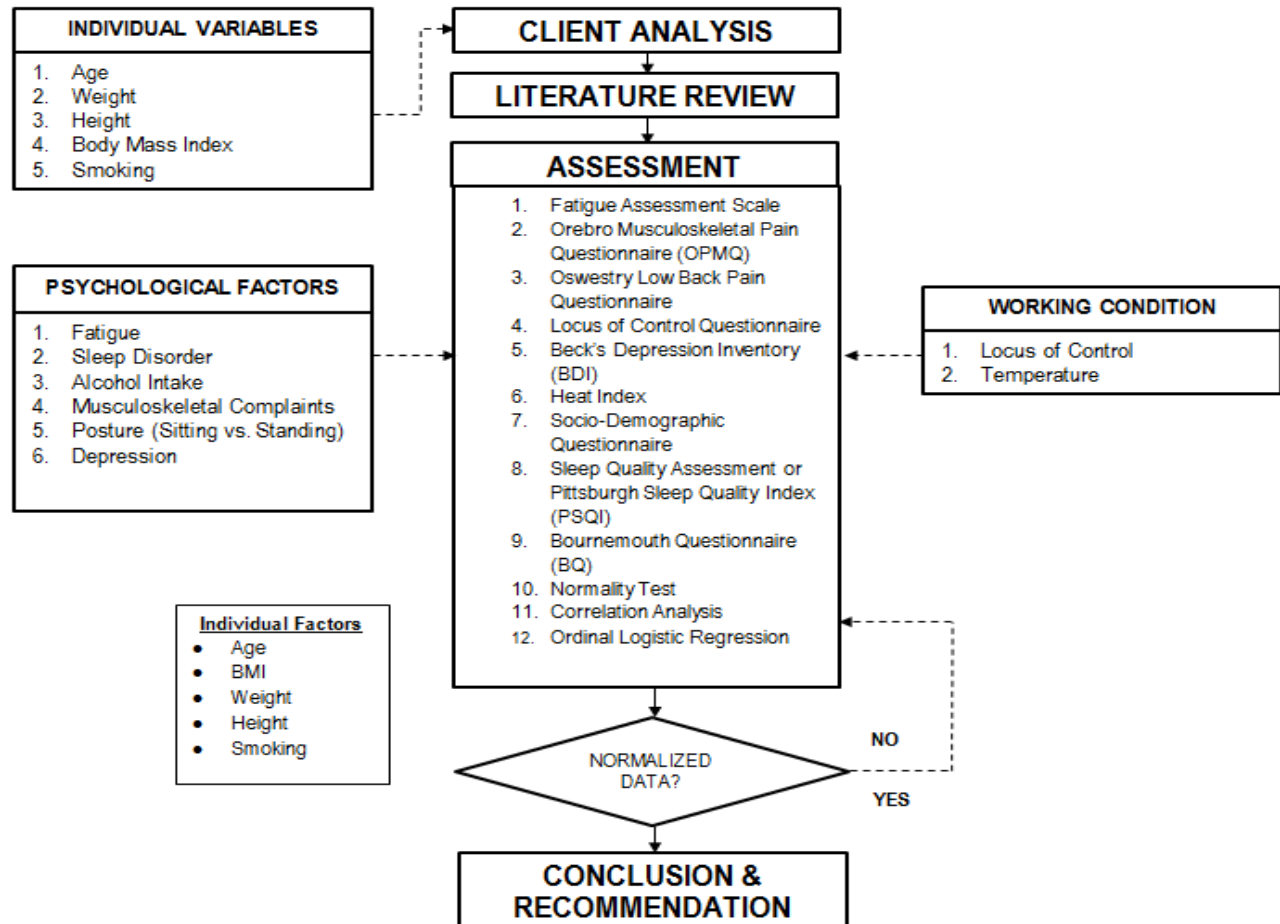
Figure 3. Model Framework

4. Results and Discussion

Most of the respondents are female and belong to any of the age brackets from 60-80 years old. Table 1 shows the different factors that contribute to low back pain (LBP). Sixty-one percent (61%) of the Filipino elderly are normal from depression, sixty-four percent (64%) of the respondents have musculoskeletal complaints, eighty-five percent are in control of their life, sixty-one percent (61%) can cope with living activities and sixty-one percent (61%) have a poor quality of sleep.

Table 2. Survey Results

Depression		
Normal	20	61
Mild	4	12
Clinical	4	12
Moderate	4	12
Severe	1	3
Extreme	0	0
Musculoskeletal Complaints		
Low	21	64
Moderate	9	27

High	3	9
Locus of Control		
No Control	0	0
Partially in control	5	15
In control	28	85
Posture(Sitting/Standing)		
Minimal	20	61
Moderate	10	30
Severe	3	9
Crippled	0	0
Bed-bound	0	0
Sleep Disorder		
Good	13	39
Poor	20	61

The figure and tabulated data determine if the data are normally distributed or not. In Anderon-Darling Normality test, if the p-value is greater than the level of significance of 0.05 can be concluded normally distributed. Having a respondent of thirty-three (33), it resulted by a p-value of 0.057. Therefore, the researchers concluded that it is normally distributed.

Table 3. Normality Test Results on Back Pain (Tabulated)

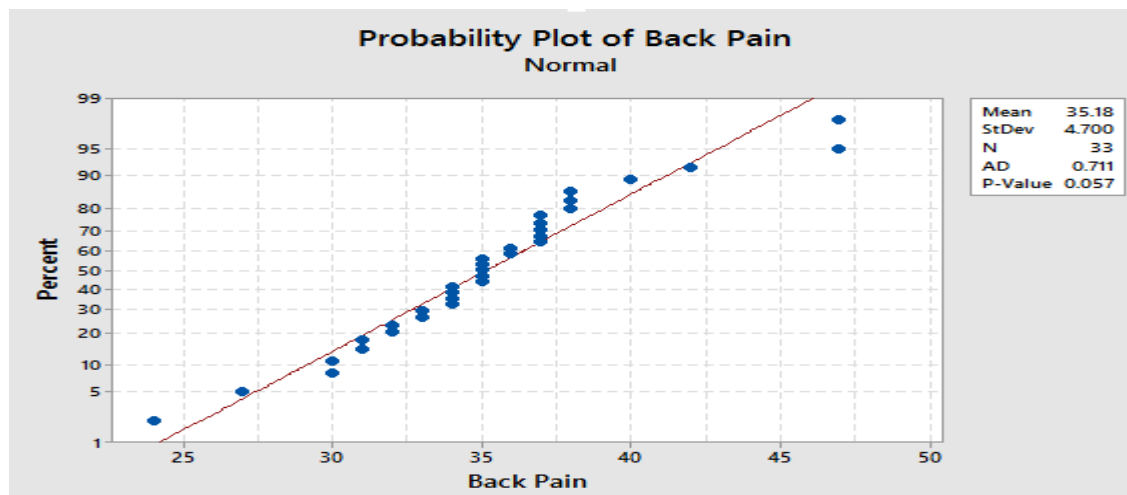| Factors	Frequency	Mean	Std. Deviation	AD	P-Value
Low Back Pain	33	35.18	4.700	0.711	0.057

Figure 4: Normality Test Graph

Through the use of Minitab, the data below shows the correlation coefficient. Age, body mass index (BMI), musculoskeletal complaints, posture (sitting/standing), fatigue, depression, locus of control and temperature results to weak correlation and only sleep results to moderate correlation.

Table 4. Minitab Result – Correlation

FACTORS	CORRELATION COEFFICIENT	STRENGTH
Age	0.091	Positively Weak Correlation
BMI	0.009	Positively Weak Correlation
Musculoskeletal	0.063	Positively Weak Correlation
Sitting/Standing	-0.060	Negatively Weak Correlation
Fatigue	0.054	Positively Weak Correlation
Depression	-0.225	Negatively Weak Correlation
Sleep	-0.303	Negatively Moderate Correlation
Locus of Control	-0.010	Negatively Weak Correlation
Temperature (F)	0.235	Positively Weak Correlation

The table below displays the results of ordinal logistic regression. P-value that is less than to the level of significance 0.05 indicates the predictors for low back pain. Sleep has a p-value of 0.045 that signifies that it is the main predictor to low back pain.

Table 5. Minitab Result – Ordinal Logistic Regression

Factors	P-Value
Age	0.123
BMI	0.682
Musculoskeletal	0.053
Sitting/Standing	0.657
Fatigue	0.229
Depression	0.076
Sleep	0.046
Locus of Control	0.236
Temperature (F)	0.452

5. Conclusions and Recommendations

5.1 Conclusions

Through the tools used by the researchers in assessing the data, by the use of normality test, the dependent variable, low back pain, that had been identified shows a normal distribution result, while on correlation analysis factors such as Age, Gender, Body mass index (BMI), Smoker/Non-smoker, Inactive Lifestyle, Prolonged Sitting/Standing, Musculoskeletal, Depression, Fatigue, Locus of Control, Sleep Disorder has no direct relationship with low back pain (LBP). From the ordinal logistics regression analysis, it has been identified that sleep disorder factor is more likely the main predictor for the low back pain (LBP) of the elders with a p-value of 0.046 which is lower than the significance level of 0.05.

From these findings, the researchers have concluded that poor quality sleep may have a strong relationship with the lower back pain which limits their movement. If elderly people have low back pain (LBP), it will decrease their ability to be productive and energetic. Other studies also proved that low back pain (LBP) is related with chronic to a severe and total disability of a patient to an extent but this study did not try to find out that issue.

5.2 Recommendations

The researchers will recommend different activities for the elders to improve the quality of sleep. (a) Maintaining good posture while sleeping is an effective way of reducing low back pain (LBP) are lying flat on the back with a supporting pillow at the back part of the legs and lying down facing the left side of the body with a pillow on the head and between your legs. (b) Exercise helps to improve sleep pattern. Exercises like eccentric straight leg raise, bent knee raise, curl-ups, sit backs and hip flexion can strengthen circadian rhythms, promoting daytime alertness and help in improving sleep. (c) Sticking to a sleep schedule will also help improve sleep. It greatly influences when they sleep and the quantity and quality of their sleep. The more stable and consistent the circadian rhythm is, the better the sleep. (d) Avoid eating and intake of caffeine before bedtime. (e) And the most important of all, drinking plenty of water every day.
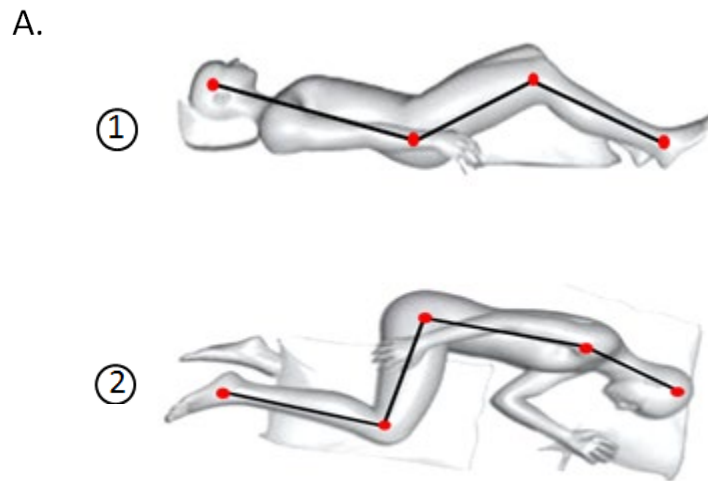
A.

Figure 5. Recommended sleeping position (1-Supine position and 2- Lateral position)

The figure above represents the two types of a recommendation of a sleeping position that those who have low back pain (LBP). Supine position is the most adopted sleeping posture, and it is able to support the human spine correctly when both the sleep system and pillow are well conceived. Lateral Position those who possessed cervical complaints is highly recommended because the body weight is distributed over a large surface, resulting in stability being optimized.
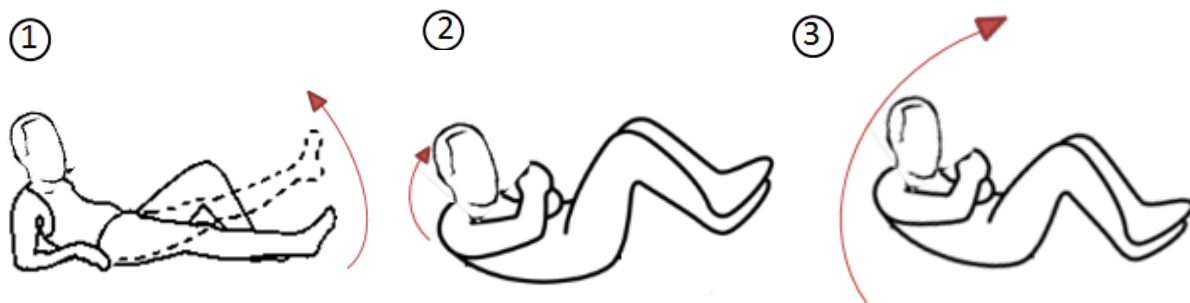

Figure 6. Recommended sample exercise (1-Eccentric straight leg raise, 2-Curl ups, 3- Sit backs)

The figure above represents the 3 examples of exercise that helps improve sleep pattern. Eccentric straight leg raise which improves the ability to get out of the bed, maintain good posture and helps back part of the body. Curl-ups help

good posture and balance by strengthening your core muscles. Sit backs helps to get out of bed and up to form the chair.

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