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Analyzing Predictors of Low Back Pain Among Farmers in Bayung Gede, Kintamani, Bangli: A Case Report Study

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Abstract.
Occupational health disease is mostly caused by unsafe working conditions. However, there is a lack of information about occupational and health safety among informal workers, including farmers in Bayung Gede, Bangli, Bali Province. As reported by the Health Department of Bangli, there was a high prevalence of complaints of low back pain (45%). It has been hypothesized that an unergonomic working position might trigger this condition. Thus, this study aimed to analyze predictors of low back pain among farmers in Bayung Gede village Kintamani, Bangli. A case report study was conducted among ten farmers in Bayung Gede village, Kintamani Bangli, on March 2022. Participants were recruited using convenience sampling techniques, and measurements used were sociodemographic, Nordic body map (NBM) and REBA assessment. As a result of the REBA assessment, it was found that there were 7 participants (70%) who were at high risk of low back pain, and 55% were in non-ergonomic working positions. Thus, this factor can be identified as the main predictor of low back pain among farmers in Bayung Gede village, Bali. This finding has shown that non-ergonomic working positions might be a crucial factor which leads to low back pain as an occupational health disease. Thus, it also can contribute as a health recommendation for the local health department to minimize occupational health disease among informal workers.

Keywords: occupational health, low back pain, farmers

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1. INTRODUCTION

The prevalence of musculoskeletal disorders in Indonesia based on ever diagnosed that is 24.7% while in the Kintamani, Bangli, which is 18.9%. Low back pain (LBP) is one of the musculoskeletal disorders in the lower back caused by various disease and poor body activity (1). Several important risk factors are associated with. The incidence of LBP is categorized into three, namely: individual factors, work factors, and factors environment. The percentage of workers in Kintamani, Bangli in the agricultural sector is 57% (2,113,571 people) of the total workforce. One of the regencies in Bayung Gede, Kintamani, Bangli is Pesawaran Regency which is a buffer zone for the capital city of Kintamani, Bangli based on its geographical location and is a new autonomous region with the agricultural sector as the livelihood that dominates the economic structure with the highest yields being the commodity of melinjo.

Farmers in their work have occupational health risks and accidents. Some of these health risk conditions include: exposure to biological and non-biological agents can cause diseases such as contact dermatitis, occupational asthma, and pneumonia, falls while working, and occupational diseases related disorders (2). Musculoskeletal disorders due to improper working position ergonomics, exposure to vibration, repetitive work, static work, and long work duration long (3). A person who does a form of work which is not ergonomic can experience musculoskeletal disorders, especially for those who work in agriculture.

2. CASE REPORT

LBP was reported by a 62-year-old male patient in Bayung Gede, Kintamani , Bangli. Since 2015, she's been experiencing LBP. The pain starts in the lower back and travels to the hamstrings like an electric shock. Due to back pain, the patient had difficulties walking and sitting for lengthy periods of time. The patient had previously been injured when he fell from a motorcycle in a sitting position. When the patient was catheterized at the time, the patient was instructed to take bed rest and stay in the hospital for 20 days. In addition, the patient is encased in the catheter. The patient was urged to undergo surgery at the time, but the patient declined. The patient had another X-ray test in 2017 and the patient was treated at the hospital with the state of the patient with diabetes and hyperlipidemia after a few years, in 2019. Following therapy, the patient received outpatient treatment and was referred to a cardiologist for follow-up. Pain radiates from the back of the neck to the buttocks and down to the feet, according to the patient. The patient is also encouraged to see a neurologist for a more thorough assessment. The patient was referred to medical rehabilitation for physiotherapy after the evaluation. On physical examination, the patient's blood pressure was 120/80 mmHg, his pulse was 85 beats per minute, his body temperature was 360°F, and his respiration rate was 21 beats per minute. On 28 September 2015, AP and lateral lumbosacral plain radiographs were taken for a radiological evaluation, and the results of the L4-5 spondylolisthesis reading were acquired.

During static inspection, the patient appears to be in pain and during dynamic inspection: the patient's body is not straight, his posture is bowed also L4-5, there was tenderness. The lumbar paravertebrae, gluteus maximus, m. quadratus lumborum, and M. hamstring are all spasming. The rectus abdominis m. obliques have a weakness. Examination of the trunk's basic movements full ROM but the patient feels pain.

2.1. Physical examination

Straight leg raise (SLR) examination was performed with the aim of knowing the presence of pressure on the nerve root. This examination can indicate the presence of radiating pain caused by disc pressure on the nerve root. 11 The implementation of the SLR examination is that the therapist passively lifts the patient's leg where the pain radiates as high as the leg flexion is 15-30 degrees and does not exceed 70 degrees. With SLR examination performed on the patient, resulting in pain radiating in the right leg, it proves that there is nerve compression on the disc. Furthermore, the patient's Valsalva test is asked to push hard, the cerebrospinal fluid (CSF) will increase and there is radicular pain. With Valsalva test produces radicular pain which proves there is pressure on the nerve. The Trendelenberg test aims to measure the strength of the gluteus muscles. With the Trendelenberg test on the patient, it was found that there was a descending buttock line on the raised leg which proved that there was weakness in the gluteus muscle. Functional examination was also performed on patients using the Barthel index. The Barthel index is used to determine the functional ability and functional activity of geriatric patients. The Barthel index consists of 10 questions with the following interpretations: 0-20: fully dependent, 21-61: heavily dependent/very dependent, 62-90: moderately dependent, 91-99: mild dependence, 100: independent. Where the results of the test in these patients is 90 with moderate dependence interpretation.

2.2. Intervention

In the pain reduction intervention, TENS is used, which is aimed at reducing pain at the nerve level in patients. TENS is a non-pharmacological treatment method to reduce pain. TENS can be used to reduce acute pain and chronic pain. 1 Furthermore, TENS is aimed at reducing pain through a mechanism that inhibits pain transmission through a pain mechanism to the brain (gate control theory) and a mechanism for releasing endorphins (a hormone in the spinal cord that reduces sensitivity to pain and affects emotions). TENS is given at a dose of three times a week, an intensity of 60 mA, continuous type and a time of 15 minutes. 10 Furthermore, conventional therapy for pain reduction. IR is a physiotherapy modality that is often used for the treatment of

LBP. IR radiation can increase blood flow and relax tissues so as to reduce pain and maximize functional activity. The physiotherapy modality used is infrared light which has a wavelength of 750 m-100 m, a frequency of 400 THz-3 THz, and a photon energy of 12.4 meV-1.7 eV. 12 William's flexion exercises method is an exercise that aims to balance the postural flexor and extensor muscles in order to reduce stress on the facet joints caused by body weight, stretch muscles and fascia in the dorsolumbar area (increase soft tissue extensibility), open the intervertebral foramen, and correct incorrect posture. 4 Lower back flexion is the focus of this back workout. Furthermore, the flexion motions in this exercise will cause the abdominal muscles (M. rectus abdominis, M. obliquus externus abdominis, M. obliquus internus abdominis, and M. transversus abdominis) to contract and strengthen, resulting in an increase in intra-abdominal pressure, which will drive the vertebral column backwards, improving body posture by minimizing lumbar hyperlordosis, reducing articular weight-bearing stress, and expanding the intervertebral foramen, relieving pressure on the facet joints and intervertebral discs, and lowering LBP. 2 Exercise therapy is done twice a week, with each movement being repeated ten times during three months intervention. During therapy, the therapist keeps an eye on the patient's condition and ensures that they are performing the exercises appropriately.

3. RESULTS

Table 1: Changing of pain, functional performance, and range of motion of participants over the baseline, 1^{st} and 2^{nd} follow-up.

		Baseline	**1^{st} follow-up (6 weeks)**	**2^{nd} follow-up (12 weeks)**
Pain (NRS)*		8	6	2
Barthel Index		93	95	100
Range of Motion (degree)				
Hip Flexion	Right	100	115	120
	Left	95	113	120
Knee Flexion	Right	130	135	140
	Left	130	135	140
Lumbar Flexion		20	30	55
Lumbar Extension		0	0	20

*Numeric rate scale

According to the table above, there was a positive change in the form of a decrease in tenderness, which was followed by a decrease in active lumbar motion discomfort and a decrease in spasm. Tenderness and motion discomfort are both symptoms of pain alterations. TENS can produce a current that is conveyed to the surface of the skin

Table 2: Muscle strength of participants over the baseline, 1st and 2nd follow-up.

Muscle Strength (kg)		Baseline	1st follow-up (6 weeks)	2nd follow-up (12 weeks)
Hip Abduction	Right Left	23	32	39
		20	33	40
Hip Abduction	Right	25	39	43
	Left	26	40	45
Hip Flexion	Right	36	40	45
	Left	38	42	46
Knee Flexion	Right	33	42	49
	Left	33	43	50

of the lower back through electrodes, causing physiological stimulation of the tissue in question, both direct and indirect.

4. DISCUSSION

According to Aoki et al., TENS can produce a current that is conveyed to the surface of the skin of the lower back through electrodes, causing physiological stimulation of the tissue in question, both direct and indirect (4). At the cellular, tissue, segmental, and system levels, direct effect occurs. The use of TENS proved to be beneficial in reducing low back pain with the use of TENS with a duration of 330 seconds and a frequency of 20 Hz. In line with the research of (5) on the extrasegmental mechanism, TENS will induce the activity of small diameter nerves (A-delta) and produce analgesia at the extrasegmental level. The application of TENS with a duration of 330 seconds and a frequency of 20 Hz was found to be effective in relieving low back pain. TENS will cause the activity of small diameter nerves (A-delta) and produce analgesia at the extrasegmental level, according to (6) research on the extrasegmental mechanism. The use of infrared (IR) to alleviate pain and muscular spasm can be achieved through the circulation mechanism and the gate control theory mechanism, according to (6). An increase in blood circulation can bring back irritant substances and metabolic waste that can increase nocisensory conductivity (bradykinin, histamine, etc.) in the circulation mechanism, whereas a decrease in the level of these irritants can slow down nocisensory conductivity, resulting in pain and discomfort. Spasms will lessen. Meanwhile, according to the gate control theory, a pleasant thermal effect has a calming impact on sensory nerve terminals, causing sensory nerve activity to decrease nocisensory activity, which transmits pain impulses, and pain to decrease (4,7).

The application of exercise therapy william's flexion exercises decreases pain levels in the elderly with low back pain with pain levels while mild pain in William's flexion exercises can increase lumbar stability because it actively trains the abdominal muscles, gluteus maximu and hamstrings. In addition, William's flexion exercise can increase intra-abdominal pressure which pushes the vertebral column backwards, thereby helping to reduce lumbar hyperlordosis and reducing pressure on the intervertebral discs which can reduce pain in the abdomen and back. Based on the research that has been done there is a significant effect between giving William flexion exercises (stretching) and decreasing pain levels in the elderly with low back pain. This can be used as a non-pharmacological therapy that can be done to reduce low back pain levels (8).

5. CONCLUSION

In conclusion, tenderness and active movement in the lumbar region are common in the elderly with LBP related to spondylolisthesis. Furthermore, it impairs the elderly's ability to operate. The findings of the treatment show that traditional treatments such as TENS and IR, as well as exercises using the William's Flexion Exercises approach, can help the elderly with LBP related to spondylolisthesis reduce pain and increase muscular tone.

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