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Prevalence and risk factor of piriformis syndrome among online motorcycle taxis in Denpasar, Bali

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ABSTRACT

Objective: the purpose of this study was to find out the prevalence and risk factors of Piriformis syndrome in online motorcycle taxis in Denpasar

Methods: This study was an observational study with cross-sectional study design. The total sample was 87 respondents, and the sampling method used a purposive sampling technique.

Results: research result showed prevalence and risk factor of piriformis syndrome based on risk factors for work duration: the prevalence of Piriformis syndrome in respondents with a duration

of work of more than 8 hours was 48 (55.2%) respondents while 39 respondents (44.8%) in respondents with a duration of work of fewer than 8 hours. Based on the habit of putting a wallet in the back pocket, there were 33 (37.9%) respondents who had that habit while respondents without that habit had 54 respondents (62.1%).

Conclusion: in a conclusion work duration, the habit of putting a wallet in the back pocket becomes a risk factor for piriformis syndrome in an online taxi driver.

Keywords: Piriformis syndrome, online taxi drivers, prevalence, and risk factor

INTRODUCTION

Piriformis syndrome is an uncommon neuromuscular disorder that is caused when the piriformis muscle compresses the sciatic nerve. It is most often caused by macro trauma to the buttocks or micro trauma from overuse of the piriformis muscle, leading to inflammation of soft tissue, muscle spasm, or both with resulting nerve compression. Our research aims were to investigate the prevalence and risk factors of Piriformis syndrome in online motorcycle taxis in Denpasar. Most of the activities carried out by online motorcycle taxis are long-term sitting activities. A long sitting position will cause a disturbance in the skeletal system / musculoskeletal disorder (MSDs). Piriformis syndrome is a disorder of the musculoskeletal system. Globally, MSDs contribute 42% to 58% of all occupational diseases. Data from the Labor Force Survey (LFS), the U.K., which shows MSDs in workers, is very high, namely 1,144,000 cases with a distribution of cases that attack the back of 493,000 cases, upper limbs or neck 426,000 cases, and lower limbs 224,000 cases. The prevalence of MSDs on public transport drivers in various parts of the world is very high among various types of work, ranging from 53% to 91%.¹ Online motorcycle taxis have sitting activities with a long duration of work. This position is one of the risk factors for piriformis syndrome.

Piriformis syndrome is a neuromuscular

disorder that occurs due to compression of the ischiatic nerve (sciatic nerve) or irritation by the piriformis muscle. This is so that the onset of pain in the buttocks area.² In our previous studies, higher piriformis syndrome frequency among Bangladeshi housewives; however, day laborers, drivers, and bankers also had the disorder.³ As many as 50% of patients with piriformis syndrome have a history of direct trauma from injury to the buttocks or hip / lower back area.⁴ Based on a survey by Sekaraam *et al.* on public transport drivers experiencing musculoskeletal complaints in the waist, hip, buttocks, limbs, and neck area.¹ The etiologies suggested in considerations of sciatic nerve compression are diversified: inflammatory, traumatic, tumoral, and malformities. In most cases, however, the compression is originally muscular, and the piriformis muscle is suspected.⁵ Piriformis syndrome is a musculoskeletal complaint that can reduce the productivity of online motorcycle taxis work so that preventive efforts are needed to prevent it.

MATERIALS AND METHODS

Study design

This study was an observational study with a cross-sectional study design with a total of 87 respondents. The sampling technique in this study was purposive sampling conducted at several online motorcycle taxi bases in Denpasar. Ethical clearance

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for this study had been issued by the research ethics commission Medical Faculty of Udayana University/Sanglah Hospital Denpasar with ethical clearance number 2017/UN14.2.2.VII.14/LP/2019.

Participants

Participants in this study were respondents who met the eligibility criteria of an online motorcycle taxi driver working in Denpasar, willing to fill in the questionnaire provided. The general condition was excellent and able to follow instructions.

Respondents who were unwilling to participate in the study and were ill during the study were excluded from this study.

Material and measurement

The research procedure began with filling out the questionnaire as a screening process to get respondents with signs and symptoms of Piriformis syndrome and risk factors.

Piriformis syndrome examination was then performed on respondents who have signs and symptoms of Piriformis syndrome by examining specific tests by physiotherapists using FAIR Tests (Flexion, Adduction, Internal Rotation).

Statistical analysis

Statistical analyses were conducted using IBM SPSS Statistics ver. 25.0 (IBM Co., Armonk, NY, USA).

RESULTS

The characteristics of respondents based on age were that the majority of respondents are male. In contrast, the characteristics of research respondents by age were the majority of respondents aged 26-35 years old (Table 1).

Table 1 results respondents with a work duration of more than 8 hours more than those who have fewer than 8 hours of work. Based on the habit of putting a wallet in the back pocket, the number of respondents who have the habit is less than that of those who do not have it (Table 2).

Respondents with work duration of more than 8 hours showed higher positive results on piriformis syndrome specific test compared with respondents with work duration less than 8 hours. Respondents who have the habit of putting a wallet in the back pocket show more positive results on piriformis syndrome specific tests than respondents who do not have the habit (Table 3).

DISCUSSION

Characteristics of respondents based on age, most respondents, aged between 26-35 years with the number of respondents as many as 45 people (51.7%) with average 32,45 years (Table 1). This is in line with statistical data in the Central Statistics Agency, which states occupation with working-age or productive age in Indonesia is someone aged between 15 years to 64 years old⁶. This study found that the prevalence of online motorcycle taxi workers who had Piriformis syndrome was 32.2%. Another study also found that onset of piriformis syndrome in the third decade of age, based on the study by Mondal *et al.* which states that the majority occur at an average age of piriformis syndrome

Table 1. Respondents characteristics based on gender and age

Respondents characteristics	Frequency	Percentage (%)	Mean	SD
Gender				
Male	71	81,6		
Female	16	18,4		
Total	87	100	1,816	8,567
Age				
17 – 25 year	17	19,5		
26 – 35 year	45	51,7		
36 – 45 year	15	17,2		
46 – 55 year	10	11,5		
Total	87	100	32,45	8,57

Table 2. Data distribution of work duration and habits of putting the wallet in the back pocket of respondents

Variable	Frequency	Percentage (%)
Work duration		
<8 hours	39	44,8
>8 hours	48	55,2
Habits of putting the wallet in the back pocket		
Yes	33	37,9
No	54	62,1

Table 3. Specific test results based on work duration and habit of putting the wallet in the back pocket

Variable	Specific test				Total (%)
	Positive		Negative		
	Σ	%	Σ	%	
Work duration					
< 8 hours	9	23,1	30	76,9	100
> 8 hours	19	39,6	29	60,4	100
The habit of putting the wallet in the back pocket					
Yes	20	60,6	13	39,4	100
No	8	14,8	46	85,2	100

patients was 32,3 years.⁷ Characteristic respondents based on gender show that female and male ratio was 1:4. This result with a review by Chahal, A *et al.*, who mentioned piriformis syndrome synonyms is fat wallet syndrome and wallet neuritis, which often occurs in men.⁸

Our results also show that respondents with a work duration of more than 8 hours, the number that shows positive specific test results more than respondents with work duration of fewer than 8 hours. Our results support the research by Boyajian-O'Neill *et al.* (2008), which states that piriformis syndrome can occur as a result of several external and internal factors of a person. External factors are sitting for a long time more than 4 hours and have the habit of putting the wallet in the back pocket of pants.⁹ A patient is presenting with piriformis syndrome symptomology that developed due to his engagement in some activities, subjecting the lower back and gluteal area to an uncomfortable posture for prolonged period.¹⁰ Prolonged sitting can cause mechanical strains in the pelvic and gluteal structures to induce the proliferation of trigger points in these structures.¹¹ Long-standing fatty wallet sitting exposes piriformis muscle and sciatic nerve vicinity under overwhelming stretch, generating ipsilateral low backache and radiating lower extremity pain of twinge character; henceforth, the condition sometimes termed as back pocket sciatica.¹²

The habit of putting a wallet in the back pocket can cause problems with the sciatica nerve because it causes repetitive compression, focal neural edema, with resultant sensitization of the compressed nerve. Both acute and chronic compressions make nerve compromised to vascular supply.¹³ Piriformis muscle stiffness due to repetitive trauma from sitting for a long time and on a rough surface pressing or pinching the sciatic nerve under the muscle. This condition will cause symptoms of sciatic nerve suppression.⁹ In chronic nerve compression, there is an increase in c-fos gene expression, which is a gene that is quickly expressed in the spinal sensory nerves in response to peripheral pain stimulus. Research by Frieboes, L.R., *et al.* found that the upregulation of c-fos gene expression occurred 1-2 weeks after injury without being accompanied by increased expression of TNF-alpha or IL-6. The condition describes an increase in nerve sensitivity without being accompanied by an inflammatory response. The study also found that the expression of NaV1.8 de novo a sodium channel was related to the development of neuropathic pain in endoneural Schwann cells after nerve injury.¹⁴

Piriformis syndrome in our study was a secondary piriformis syndrome that occurs due to

a trigger of macro and micro trauma factors and ischemic effects. Trauma occurs not acutely but can occur within a few months before clinical symptoms appear. Risk factors in our study were the long duration of sitting and the habit of placing a wallet in the back pocket, causing trauma to the buttock, causing inflammation and spasms of the muscles. Inflammatory substances such as prostaglandins, histamine, bradykinin, and serotonin are released from the inflamed muscles. All of which cause a cycle of pain-spasm-inflammation-irritation.¹⁵

The type of pain that occurs in our study respondents was chronic pain. Chronic pain caused by continuous C-fiber stimulation, tissue inflammation, and peripheral nerve injury. It also occurs due to central sensitization that causes hyperalgesia and allodynia. Decreased pain threshold is a characteristic of central sensitization, which is associated with increased responsiveness of neurons in the dorsal horn and associated with gene expression changes. Activation of immune cells also plays an important role in the pathophysiology of pain hypersensitivity.¹⁶

CONCLUSION.

Our conclusion is the prevalence of online motorcycle taxi drivers who have piriformis syndrome based on the results of specific as many as 28 respondents from a total of 87 respondents (32.2%). It was found that the length of sitting and the habit of putting the wallet in the back pocket were risk factors for Piriformis syndrome in online motorcycle taxi drivers. For the future study, we recommended assessing other risk factors, which are risk factors for piriformis syndrome. We also recommend ed using a larger sample size to generalize results to a broader population.

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