

The Relation between Sitting Duration and Suspected Hernia Nucleus Pulposus among Cardboard Factory Workers in Tangerang

Christian Shiady, Tjie Haming Setiadi

Department of Anatomy, Faculty of Medicine, University of Tarumanegara
Jakarta, Indonesia

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Abstract: Low back pain (LBP) has been the leading cause of disability in the world. One of the most frequent is a disease named hernia nucleus pulposus (HNP) that triggering the low back pain sensation. There are various factors that lead to the occurrence of the disease. One of those is sitting in prolonged duration (≥ 5 hours)/day. This study aims to determine whether prolonged sitting duration influences the incidence of hernia nucleus pulposus among the factory workers. The method of this study is analytical-cross sectional and used non-random consecutive sampling. The study was in Tangerang city, on March 2019. There were 75 factory workers, each subject underwent the Laseque and Bragard test to assess for suspicion of hernia nucleus pulposus. 48 respondents were categorized as those who sit in prolonged duration and 27 respondents were categorized as those who sit in normal duration. Nine people were suspected of having the hernia nucleus pulposus, seven of which admitted having prolonged sitting duration, while the remaining two sit in a normal period ($p= 0.48$) by Fischer test. The prevalence ratio was 2.11 (confidence interval 95%). Prolonged sitting duration has no correlation with suspected HNP, but has 2.11 times higher risk to LBP.

1 INTRODUCTION

A WHO study in “The Global Burden of Disease 2010 Study” stated that it was difficult to estimate the incidence of low back pain because its first episode was already high even in young adults. Data from the study showed that the prevalence of low back pain ranged between 15% to 45% in general, even reaching 60% to 70% in industrial countries (Duthey, 2013). When compared to the previous study in 1990, the rate of low back pain had increased by 22%, which means low back pain has become a serious problem that hasn’t been resolved totally (Driscoll et al, 2014). A study in Central Java, Indonesia conducted by Herry Koesyanto found that the prevalence of low back pain among Indonesian factory workers ranged between 7.6% to 37%, indicating a high rate of low back pain in industrial sector such as Jabodetabek (Koesyanto, 2013).

Because of Indonesia’s high working hours, as well as the lack of data about the incidence of hernia nucleus pulposus in Jabodetabek, thus this study was

conducted to determine the relation between prolonged sitting on suspected hernia nucleus pulposus.

2 METHODS

This study is an analytical study with cross-sectional approach and was done in March – April 2019. The number of samples were 75 factory workers of PT. Perdana Mega Jaya, which were collected using non-random consecutive sampling method. The inclusion criteria are employees aged between 18 to 65 years old, had been working for at least 6 months, and were willing to be a respondent. The exclusion criteria are pregnant women, having a spinal disease or other diseases related to the spine. The examination includes short interview and physical examination using the combination of Laseque and Bragard test. The independent variable of this study is the duration of sitting which is categorized as long (≥ 5 hours) and not long (< 5 hours) and the

dependent variable is the suspicion of having hernia nucleus pulposus based on the physical examination. The result was processed using chi-square/fisher statistical test in free trial SPSS 25th version.

3 RESULTS

Table 1: Respondents' characteristics.

Characteristics	Frequency (%)	Mean ± DS	Median (Min; Max)
Sex			
Male	66 (88%)		
Female	9 (12%)		
Age (years)			
≤ 25	20 (26.67%)	33.37 ± 11.26	29 (18; 60)
26-45	41 (54.67%)		
> 45	14 (18.67%)		
Weight (kg)		59.11 ± 9.01	58 (41; 91)
Height (cm)		165.4 ± 6.76	165 (145; 185)
BMI (kg/m²)			
< 18.5	10 (13.33%)	21.61 ± 2.97	21.30 (14.69; 29.71)
18.5-22.9	41 (54.67%)		
23.0-24.9	13 (17.33%)		
≥ 25.0	11 (14.67%)		
History of LBP			
Yes	36 (48%)		
No	39 (52%)		
Total	75 (100%)		

From all 75 subjects, the most common characteristics are male, aged 26 – 45 years old with 59.1 kg average weight and 165.4 cm average height, BMI of 18.5-22,9 kg/m², and most of them didn't have history of low back pain.

Table 2: Sitting Duration.

Sitting Duration (hours/day)	Frequency (n)	Percentage (%)
1-2	13	17.33
3-4	14	18.67
5-6	21	28.00
7-8	16	21.33
> 8	11	14.67

Table 3: Interpretation of Sitting Duration.

Category	Frequency (n)	Percentage (%)
Normal	27	36
Prolonged	48	64
Total	75	100

There were 5 groups of sitting duration with distribution such as 13 subjects sit for 1-2 hours/day, 14 subjects sit for 3-4 hours/day, 21 subjects sit for 5-6 hours/day, 16 subjects sit for 7-8 hours/day, and 11 subjects sit for more than 8 hours/day. From the data, we can conclude that 27 subjects sit in normal duration while 48 others sit in prolonged duration.

Table 4: Physical Examination Result.

Physical Examination	Frequency (n)	Percentage (%)
Lasegue test		
Positive	18	24
Negative	57	76
Bragard test		
Positive	9	12
Negative	66	88

Table 5: Interpretation of Physical Examination.

	Frequency (n)	Percentage (%)
Normal	66	88
Suspected HNP	9	12
Total	75	100

According to the physical examination which consisted of laseque and bragard tests, there were 66

(88%) subjects that were classified as normal and 9 (12%) subjects were suspected to have HNP.

Table 6: Relation between Sitting Duration and Suspicion of HNP.

Interpretation of Sitting Duration	Suspected HNP (%)	Normal (%)	Total	p	PR	CI 95%	
						Lower	Upper
Prolonged	7 (9.33%)	41 (54.67%)	48	0.48	2.11	0.74	4.50
Normal	2 (2.67%)	25 (33.33%)	27				
Total	9	66	75				

From the table above, the p value which is computed by using fisher statistic test in SPSS is 0.48 with prevalence risk >1 and 95% confidence interval.

From 75 respondents who are employees of the cardboard factory PT. Perdana Mega Jaya in Tangerang city, there were 48 (64%) respondents with prolonged sitting duration and 27 (36%) respondents with normal sitting duration. The results showed that of nine people suspected of hernia nucleus pulposus, seven (9.33%) were respondents who belonged to prolonged sitting duration group, while two (2.67%) respondents belonged to normal sitting duration group. Although the prevalence was higher in the group of respondents whose duration of sitting was long, but through Fisher's calculation, the p value showed a value of 0.48 so that the difference could be considered insignificant because it exceeded the 0.05 limit.

4 DISCUSSION

Based on data from the results on 75 respondents at PT. Perdana Mega Jaya, Tangerang, on March 23 and 30, 2019, we found 9 out of 75 (12%) respondents had a physical examination showing a suspicion of nucleus pulposus hernia. All respondents were divided into 3 age groups which are younger than or equal to 25 years old, 26-45 years old, and older than 45 years. Of the 9 respondents suspected of nucleus pulposus hernia, 2 respondents belonged to the age group of younger than 25 years old, 6 respondents belonged to the age group 26-45 years old, and 1 respondent belonged to the age group of older than 45 years old. If each of the respondents whose results showed a suspicion of hernias nucleus pulposus being held against their respective age groups, the results of the age group of

26-45 years were the peak of this suspected nucleus pulposus hernia with a prevalence of 14.63%. The results of this study are in accordance with Gopal et Mahaldevan's research in 2015 which stated that the peak incidence of nucleus pulposus hernia is in the age range of 26-45 years old (Gopal and Mahadevan, 2015).

From the data from the study of 75 respondents, 9 subjects were suspected of having a nucleus pulposus hernia. The nine subjects if grouped by body mass index were spread into 1 person out of 10 respondents classified as underweight (10%), 6 people from 41 respondents who were classified as normal (14.63%), 1 person from 13 respondents classified as overweight (7.69%), and 1 person from 11 respondents classified as obese (9.09%). This is consistent with the research conducted by Kanayama et al., Who said that body mass index did not significantly influence the incidence of herniation in the nucleus pulposus (Kanayama et al, 2009).

Based on research data based on a short questionnaire and the results of physical examinations conducted at PT. Perdana Mega Jaya, Tangerang, found that 66 respondents consisting of 41 respondents with a long duration of sitting and 25 respondents with a short duration of sitting did not show any abnormality or suspected nucleus pulposus hernia, or in other words normal. However, there were also nine respondents consisting of seven respondents with a long duration of sitting and two respondents with a short duration of sitting who showed suspicion of nucleus pulposus hernia based on a series of physical examinations that had been carried out. Based on fisher's test, p value is 0.48 which means that the relationship between duration of sitting and the incidence of nucleus pulposus hernia is not significant. Obtained prevalence ratio 2.11 with 95% confidence interval.

The final results of this study are in accordance with Billy et al.'s research which examined the effects of prolonged sitting on the structure of the spinal joints that might cause lower back pain. Billy et al.'s research states that sitting for more than four hours is not significant in changing the anatomical structure of the spinal joints so that it does not cause a sensation of lower back pain but may affect the progression of lower back pain that has occurred or will occur in the future (Billy et al, 2014).

5 CONCLUSION

There were no association between sitting duration and suspected HNP among cupboard factory in Tangerang..

SUGGESTION

Many factors have not examined such as smoking, exercise, and sitting position that is good or not appropriate. In addition, ergonomics and work safety must always be upheld both in research institutions and in other workplaces, even applied in all aspects of life to maintain the body's condition to avoid the risk of lower back pain due to the nucleus pulposus hernia. As for if the reader wants to do a similar study, the writer suggests paying attention to what confounders have been described by the author in the previous chapter. Finally, the most important thing that readers and writers can do is provide education about the subject matter of this research to the public so that the principle of work safety is more concerned for the creation of a safe and secure work environment for the welfare of workers in Indonesia.

REFERENCES

- Billy GG, Lemieux SK, Chow MX. 2014. Changes in lumbar disk morphology associated with prolonged sitting assessed by magnetic resonance imaging. *Science Direct*; [cited 2019 Apr 8]. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S1934148214001002>
- Driscoll T, Jacklyn G, Orchard J, Passmore E, Vos T, Freedman G et al. 2014. The global burden of occupationally related low back pain: estimates from the Global Burden of Disease 2010 study. Sydney: ARD Online First.
- Duthey B. Low back pain. In: Kaplan W, Wirtz VJ, Mantel-Teeuwisse A, Stolk P, Duthey B, Laing R, editors. 2013. Priority medicines for Europe and the world 2013 update [Internet]. Geneva: WHO; [cited 2018 Aug 10]. Available from: http://www.who.int/medicines/areas/priority_medicines/MasterDocJune28_FINAL_Web.pdf?ua=1
- Gopal V, Mahadevan K. 2015. Importance of hyaline material in herniated lumbar disk pathology: predicting the presence of hyaline from preoperative magnetic resonance imaging and its clinical significance. *Research Gate*; [cited 2019 Apr 8]. Retrieved from: https://www.researchgate.net/publication/291425247_Importance_of_Hyaline_Material_in_Herniated_Lumbar_Disk_Pathology_Predicting_the_Presence_of_Hyaline_from_Preoperative_Magnetic_Resonance_Imaging_and_its_Clinical_Significance.
- Kanayama M, Togawa D, Takahashi C, Tomoya T, Hashimoto T. 2009. Cross-sectional magnetic resonance imaging study of lumbar disc degeneration in 200 healthy individuals. *JNS*; [cited 2019 Apr 8]. Retrieved from: <https://thejns.org/spine/view/journals/j-neurosurg-spine/11/4/article-p501.xml>
- Koesyanto H. 2013. Masa kerja dan sikap kerja duduk terhadap nyeri punggung. Semarang: Universitas Negeri Semarang.