Research Article

Relationship between Physical Activity of Pregnant Women in the Third Trimester of Pregnancy with Preterm Birth Using Kaiser Physical Activity Survey (KPAS) Questionnaire

Hubungan antara Aktivitas Fisik Perempuan Hamil pada Trimester Ketiga Kehamilan dengan Persalinan Prematur Menggunakan Kuesioner Kaiser Physical Activity Survey (KPAS)

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Abstract

Objective: To examine the relationship between the intensity of physical activity of pregnant women with preterm birth and to know the relationship between types of physical activity of pregnant women with preterm birth.

Methods: This research was a case-control study that was conducted at Dr. Cipto Magunkusumo Hospital and Karawang Hospital in January 2017 to June 2017 with KPAS questionnaire which was divided into two groups, preterm birth and term birth. The sample size was 127 subjects for each group. The analysis was done by multivariate analysis of the etiologic concept.

Results: In term birth, the most frequent physical activity intensities were: moderate intensity (64.6%, n = 82), light intensity (22%, n = 28), and vigorous intensity (13.4%, n = 17). In preterm birth, the most frequent physical activity intensities were: light intensity (40.1%, n = 51), vigorous intensity (33.9%, n = 43), and moderate intensity (26%, n = 33). Adjusted OR of preterm birth in light intensity versus moderate intensity was OR 5.32 (95% CI, 2.80-10.13; p = < 0.001). While adjusted OR of preterm birth in vigorous intensity compared with moderate intensity was OR 6.29 (95% CI, 3.28-13.46; p = < 0.001). Work and sport have a significant association with preterm birth with OR 3.19 (95% CI, 1.62 - 6.28; p = 0.001) and OR 1.85 (95% CI,1.11 - 3.09; p= 0.017). Occupational conditions are also associated with preterm birth, including: weight lifting with OR 5.16 (95% CI, 1.10-24.08, p = 0.021), walking with OR 3.57 (95% CI, 1.61-7.92, p = 0.001), sitting with OR 2.79 (95% CI, 1.23-6.31, p = 0.011), and standing with OR 3.04 (95% CI, 1.40-6.59; p = 0.003).

Conclusion: There is a significant relationship between the intensity of physical activity and type of physical activity in pregnant women with preterm birth.

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Keywords: intensity of physical activity, KPAS, physical activity, preterm labour

Abstrak

***Tujuan**: Mengetahui hubungan antara intensitas aktivitas fisik perempuan hamil dengan persalinan prematur dan mengetahui hubungan antara jenis aktivitas fisik perempuan hamil dengan persalinan prematur.*

***Metode**: Penelitian ini merupakan penelitian kasus kontrol yang dilakukan di RS Dr. Cipto Magunkusumo dan RS Karawang pada bulan Januari 2017 hingga Juni 2017 dengan kuesioner KPAS yang dikelompokkan menjadi dua, yaitu persalinan prematur dan persalinan cukup bulan. Jumlah sampel adalah 127 subjek untuk masing-masing kelompok. Analisis dilakukan dengan analisis multivariat konsep etiologik.*

***Hasil**: Pada persalinan cukup bulan, secara berurutan intensitas aktivitas fisik yang paling banyak dilakukan, antara lain : intensitas sedang (64,6%, n= 82), intensitas ringan (22 %, n = 28), dan intensitas berat (13,4 %, n = 17). Pada persalinan prematur, secara berurutan intensitas aktivitas fisik yang paling banyak dilakukan, antara lain: intensitas ringan (40,1 %, n = 51), intensitas berat (33,9 %, n = 43), dan intensitas sedang (26%, n = 33). Hubungan antara intensitas aktivitas fisik ringan dibandingkan intensitas sedang untuk persalinan prematur memiliki OR 5,32 (IK 95% 2,80-10,13; p = < 0,001). Sedangkan hubungan antara intensitas aktivitas fisik berat dibandingkan intensitas sedang untuk persalinan prematur memiliki OR 6,29 (IK 95% 3,28-13,46; p = < 0,001). Pekerjaan dan olahraga memiliki hubungan bermakna dengan persalinan prematur dengan OR 3,19 (IK 95% 1,62 - 6,28; p = 0,001) dan OR 1,85 (IK 95% 1,11 - 3,09; p= 0,017). Kondisi pekerjaan juga berhubungan dengan persalinan prematur, antara lain : angkat berat (OR 5,16; IK 95% 1,10-24,08; p = 0,021), berjalan (OR 3,57; IK 95% 1,61-7,92; p = 0,001), duduk (OR 2,79; IK 95% 1,23-6,31; p = 0,011), dan berdiri (OR 3,04; IK 95% 1,40-6,59; p = 0,003).*

***Kesimpulan**: Terdapat hubungan yang bermakna antara intensitas aktivitas fisik dan jenis aktivitas fisik pada perempuan hamil dengan persalinan prematur.*

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***Kata kunci**: aktivitas fisik, intensitas aktivitas fisik, KPAS, persalinan prematur*

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INTRODUCTION

Preterm birth has become a global problem, and over 60% of preterm birth occur in Africa and South Asia. Currently, Indonesia is in the fifth rank after India, China, Nigeria, and Pakistan.[1,2] In Indonesia, preterm birth is a national problem that causes neonatal deaths more than 70% without congenital abnormalities, and until this time, preterm birth is still being the first cause of neonatal death.[1,2] Now, physical activity start to become a consideration as a risk factor of preterm birth due to its capability to be modified. The hypothesis that physical activity can lead to preterm birth is from the change in blood flow at the time of physical activity which causes the disturbance of O2, CO2, and transplacental nutrients transport thus increasing the risk of preterm birth.[3-7] However, in other studies it was found that exercise would stimulate placenta cell proliferation and increase the volume of vascular villi, thereby increasing the transfer of oxygen and nutrients through the placenta and the baby.[8,9] Study on the relationship between types of physical activity with preterm birth has been widely done. Physical activity in women includes household activities, occupation, active living habits, and exercise. To date, there are only a few studies about the relationship between the total physical activity of pregnant women with preterm birth and it still could not be concluded whether there was a relationship between physical activity and preterm birth.[4,10] One cause that made the relationship between total physical activity and preterm birth still could not be concluded was the use of various methods in measuring physical activity.[4,11]

The purpose of this study was to determine the relationship between physical activity intensity with preterm birth and to determine the relationship between physical activity type with preterm birth by using validated questionnaire: Kaiser Physical Activity Survey (KPAS)

METHODS

This study was case control with 127 subjects for each group which performed at Dr. Cipto Mangunkusumo Hospital (RSCM) and Karawang hospital from January 2017 to June 2017.

Sampling in this study was conducted with convenient sampling. Information was obtained by interviews that were taken from patients who entered into case groups and control groups. Case group was patient who underwent preterm birth at Dr. Cipto Mangunkusumo Hospital (RSCM) and RS Karawang from January 2017 to June 2017 who had met the inclusion criteria and did not fall into the exclusion criteria. Information from both groups was taken as long as the patient was still in the hospital until the number of sample targets was fulfilled. Information was obtained by conducting interviews using written questions which were contained in the KPAS questionnaire. Information on physical activity based on the questionnaire is the physical activity that was performed by pregnant women in the third trimester.

Inclusion criteria in this study include: women who conduct preterm birth (third trimester) in Dr. Cipto Mangunkusumo hospital and Karawang hospital period January 2017 to June 2017; willing to follow the study and fill out the completeness of informed consent.

Exclusion criteria in this study include : vaginal bleeding in second trimester and third trimester confirmed by history taking with a history of vaginal bleeding in 2nd and 3rd trimester that occurred more than one time; cervical incompetence based on history taking and or ultrasound examination and from anamnesis is obtained from the history of the outcome of conception in the second trimester without any pain, and or there is an ultrasound examination which shows the cervical abnormalities and or amnion bag funneling; multiple pregnancies which was confirmed based on patient's medical history after she had both in current pregnancy; the history of abortion in this pregnancy which was confirmed by history taking; sudden onset of trauma which was confirmed by history taking; hypertension, diabetes mellitus, preeclampsia.

The KPAS Questionnaire

The KPAS questionnaire had been validated in 54 female samples at Baystate Medical Center using a seven-day accelerometer measurement. The coefficient correlation used to measure reproducibility in KPAS has ranged between r = 0.76 to 0.86 and Spearman's correlation coefficient between KPAS and 3 published cutting points for the accelerometer classification is ranged from r = 0.49 to 0.59.

Statistical Analysis

Statistical analysis was performed by using SPSS 20® software for the Windows® operating system. The analysis was done by multivariate analysis of the etiologic concept.

RESULTS

Characteristics of the subjects are presented in Table 1. In term birth, physical activity with moderate intensity is the highest level of physical activity intensity (64.6%, n=82), followed by physical activity with moderate intensity (22%, n=28), and the last was physical activity with vigorous intensity (13.4%, n=17). However, different result was found in preterm birth. In preterm birth, physical activity with light intensity was the most common physical intensity (40.2%, n=51), followed by physical activity with vigorous intensity (33.9%, n=43), and the last is physical activity with moderate intensity (26%, n=33).

Table 1. Subject's Characteristics

Variable	Preterm birth		p	or	95% CI	
	+ n (%)	- n (%)			Min	Max
Physical activity intensity			<0.001			
Light	51 (40.1)	28 (22.0)	<0.001	4.53	2.45	8.36
Moderate	33 (26.0)	82 (64.6)	Comparison			
Vigorous	43 (33.9)	17 (13.4)	<0.001	6.29	3.15	12.55
Education			0.002			
Elementary school	17 (13.4)	6 (4.7)	0.443	5.67	0.43	74.38
Junior high school	72 (56.7)	56 (44.1)	0.840	2.57	0.23	29.08
Senior high school	37 (29.1)	63 (49.6)	1.000	1.18	0.10	13.40
Bachelor	1 (0.8)	2 (1.6)	Comparison			
Age						
≤ 35 years old	68 (53.5)	78 (61.4)	0.253	0.72	0.44	1.19
> 35 years old	59 (46.5)	49 (38.6)	Comparison			
Vaginal discharge						
Yes	68 (53.5)	42 (33.1)	0.002	2.33	1.40	3.88
No	59 (46.5)	85 (66.9)	Comparison			
Parity						
Multiparity	89 (70.1)	76 (59.8)	0.115	1.572	0.94	2.64
Nulliparity	38 (29.9)	51 (40.2)	Comparison			
Closed pregnancy distance						
Yes	60 (47.2)	42 (33.1)	0.030	1.81	1.09	3.01
No	67 (52.8)	85 (66.9)	Comparison			
History of preterm birth						
Yes	57 (44.9)	45 (35.4)	0.159	1.48	0.90	2.46
No	70 (55.1)	82 (64.6)	Comparison			
Smoke						
Yes	21 (16.5)	20 (15.7)	1.000	1.06	0.54	2.07
No	106 (83.5)	107 (84.3)	Comparison			
Alcohol						
Yes	1 (0.8)	0 (0.0)	1.000	-		
No	126 (99.2)	127 (100.0)	Comparison			

Table 2 shows the relationship between physical activity intensity and preterm birth by controlling confounding variables which were: education level, vaginal discharge, parity, close pregnancy distance, and history of preterm birth. Physical activity with light intensity has OR 5.32 (95% CI, 2.80-10.13; p= < 0.001). Compared with moderate intensity. While physical activity with vigorous intensity has OR 6.65 (95% CI, 3.28-13.46; p = < 0.001) compared with moderate intensity.

Table 3 shows the relationship between physical activity type and preterm labor. Adjusted OR of working in preterm birth was 3.19 (95% CI, 1.62-6.28; p = 0.001) and adjusted OR of exercise in preterm birth was 1.85 (95% CI, 1.11-3.09; p = 0.017). Working condition was also associated with preterm birth, including: weight lifting (OR 5.16, 95% CI,1.10-24.08; p= 0.021), walking (OR 3.57; 95% CI,1.61-7.92; p = 0.001), sitting (OR 2.79; 95% CI, 1.23-6.31; p = 0.011), and standing (OR 3.04; 95% CI,1.40-6.59; p = 0.003).

Table 2. Relationship between Physical Activity Intensity with Preterm Birth

	Preterm birth		Unadjusted			Adjusted		
	Positive n (%)	**Negative n (%)**	**p**	**or**	**CI 95%**	**p**	**or**	**CI 95%**
Physical activity intensity			<0.001			<0.001		
Light	51 (40.2)	28 (22.0)	<0.001	4.53	2.45-8.36	<0.001	5.32	2.80-10.13
Moderate	33 (26.0)	82 (64.6)				Comparison		
Vigorous	43 (33.9)	17 (13.4)	<0.001	6.29	3.15-12.55	<0.001	6.65	3.28-13.46

Table 3. Relationship between Physical Activity Intensity with Preterm Birth

Variable	Preterm birth		p	or	95% CI	
	+ n(%)	**- n(%)**			**Min**	**Max**
Working						
Yes	36 (28.3)	14 (11.0)	0.001	3.19	1.62	6.28
No	91 (71.7)	113 (89.0)				
Exercise						
No	88 (68.2)	67 (53.6)	0.017	1.85	1.11	3.09
Yes	41 (31.8)	58 (46.4)				
Working condition Weightlifting						
Always-often	10 (7.8)	2 (1.6)	0.021	5.16	1.10	24.08
Never-seldom	119 (92.2)	123 (98.4)				
Walking						
Always-often	28 (21.7)	9 (7.2)	0.001	3.57	1.61	7.92
Never-seldom	101 (78.3)	116 (92.8)				
Sitting						
Always-often	23 (17.8)	9 (7.2)	0.011	2.79	1.23	6.31
Never-seldom	106 (82.2)	116 (92.8)				
Standing						
Always-often	27 (20.9)	10 (8.0)	0.003	3.04	1.40	6.59
Never-seldom	102 (79.1)	115 (92)				

DISCUSSION

In preterm birth, physical activity with light intensity was the most common physical intensity that was done by pregnant woman (40.2 %, n = 51), followed by vigorous intensity (33.9 %, n = 43), and the last was physical activity with moderate intensity (26 %, n = 33). The results of this study were different from previous studies that most pregnant women would reduce their physical activity. In this study, the most frequent intensity level of physical activity was physical activity with moderate intensity, and vigorous intensity which was 78% of all term birth and subjects who performed moderate intensity and vigorous intensity in preterm birth were 59.9%.

Based on the previous study it was found that only 15% of pregnant women who fulfill the recommendations of physical activity in pregnant women based on ACOG (2002).[2] In addition, a study which was conducted by Bisson et al (2017) showed that there was a decrease in the intensity of physical activity of pregnant women starting from the first trimester to third-trimester pregnancy.[12] In addition, in a study which was conducted by Santos et al. (2014) found that pregnant women who had no activity during pregnancy ranged from 64.5% to 91.5% and tended to increase in the third trimester of pregnancy.[13] Similarly, Pereira et al. (2007) showed that the prevalence of inactive pregnant women increased from 12.6% at the time before pregnancy to 21.6% in the second trimester and did not change until 6 months after delivery.[14] Based on the previous study, it could be seen that there were differences between the results of this study with research that was conducted previously. These differences can be influenced by differences in nutrients before pregnancy, socio-economic environment, and socio-cultural environment.[15]

In this study, we found that adjusted OR of light intensity of physical activity in preterm birth was 5.32 (95% CI, 2.80 - 10.13; p = <0.001) compared with moderate-intensity physical activity for preterm birth. The light intensity of physical activity was associated with preterm birth was caused by the association between light physical activity with gestational diabetes mellitus and preeclampsia which could lead to placental insufficiency and increased inflammatory cytokines leading to preterm birth.[13,16]

Adjusted OR of physical activity with severe intensity in preterm birth was 6.65 (95% CI, 3.28-13.46; p = <0.001) compared with moderate-intensity physical activity for preterm birth. This may be due to other confounding factors, such as nutrient status, and body weight that has not been controlled in this study. Therefore, further research is needed by controlling for confounding factors which were nutrition, and body weight.[17,18]

The strengths of the present study include: This study was conducted by using multivariate analysis so that confounding variables and interaction variables that may be associated with preterm birth can be controlled; this research used case-control as study design; this study used a validated KPAS questionnaire. Our study also has limitations, which in this study there was a possibility of overestimation of the intensity of physical activity, although the questionnaires used have used a validated questionnaire using accelerometry. To improve the accuracy in assessing the intensity of physical activity in pregnant women, the future study can be done accelerometry to know the intensity of physical activity accurately.

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