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Association between sedentary time and health-related quality of life in primiparas

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Abstract

Introduction: This study aims to investigate the relationship between the sedentary time one month postpartum and the health-related quality of life (HRQOL) four months postpartum, as well as the difference based on parity.

Methods: The HRQOL for women four months postpartum was measured using the SF-12® Health Survey, and three summary scores: Physical Component Summary (PCS), Mental Component Summary (MCS), and Role-Social Component Summary (RCS) were calculated. Sedentary time was obtained using the Global Physical Activity Questionnaire. Participants were categorized into two groups using the third quartile of the sedentary time as the cut-off point. Multiple regression analysis was conducted based on parity using PCS, MCS, and RCS as the objective variables; sedentary time as the explanatory variable; and age, mode of delivery, and the amount of physical activity (PA) as the confounding variables.

Results: Participants comprised 108 women, of which 51 (47.2%) were primiparas. A relationship between sedentary time and lower PCS was observed in primiparas (partial regression coefficient = -5.47; 95% confidence interval = -10.45, -0.48), but not in multiparas, after adjusting for confounding variables.

Conclusion: In future postpartum care, decreasing sedentary time in the early postpartum period may lead to better HRQOL in primiparas.

Keywords

HRQOL Sedentary time Postpartum Parity

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Introduction

Health-related quality of life (HRQOL) is a multidimensional concept that includes aspects of physical, mental, and social health¹⁾. In recent years, HRQOL has become an important health indicator²⁾. During the postpartum period, mothers' responsibilities can significantly affect women's HRQOL²⁾. Studies suggest that a decline in HRQOL after childbirth is associated with postpartum depression^{3,4)}, which could lead to maternal suicide^{5,6)}. Therefore, it is important to maintain or improve postpartum HRQOL.

Both Physical Activity (PA) and decreased sedentary time are considered to improve mental health disorders such as depression and anxiety, including postpartum depression^{7,8)}. Unfortunately, the amount and intensity of PA often decreases during the postpartum period⁹⁾. In many Asian countries¹⁰⁾, including Japan¹¹⁾, early postpartum rest is considered important; however, there are some reported disadvantages of this kind of rest¹²⁾. In addition, postpartum PA is mostly related to childcare¹³⁾. Therefore, PA for primiparas may be significantly lesser, compared to that for multiparous women taking care of older children^{14,15)}. This reduced PA in primiparas is a cause for concern as it could lead to prolonged sedentary behavior.

Prolonged sedentary behavior can negatively influence the physical component of HRQOL¹⁶⁾. However, to the best of the author's knowledge, few studies discuss physical activity in the early postpartum period. Furthermore, none has investigated the association between sedentary behavior and HRQOL during early postpartum. From the above previous studies, we hypothesized that longer sedentary time during the first month postpartum would result in a lower HRQOL score after four months postpartum. The purpose of this study was to investigate the association between sedentary time and HRQOL in the early postpartum period. The new findings may help to clarify whether physical activity or rest should be encouraged in the early postpartum period.

This study investigates the relationship between sedentary time and HRQOL. It aims to test whether the length of sedentary time, one month postpartum, can influence the HRQOL four months postpartum. We also investigated the difference in this relationship based on parity.

Methods

Study design and participants

This study employed a cross-sectional design. Participants were a cohort of postpartum women who attended four months of well-child checkups. These checkups were conducted from July to October 2020 at a local government health-care facility in Hyogo prefecture. A detailed questionnaire was mailed to the participants and collected at the time of their medical checkup. Using the questionnaire, the physical and medical history details of the participants were collected, and the ages of all participants were obtained from their medical records.

Questionnaires with incomplete responses were resent to the relevant participants through mail. We asked whether physical activity was prevented by physical or mental reasons in the first month postpartum period. If yes, the specific name of the disease was also asked, and we excluded those who had mentioned

the name of the disease. We also excluded those who gave birth to congenitally diseased or premature infants, those who provided incomplete data, and those with missing medical records.

The researchers shared the purpose of the study with all participants. Consent forms were mailed home with the questionnaires, and completed consent forms were received at the time of questionnaire collection. This ensured that written consent, based on the guidelines of the World Medical Association Declaration of Helsinki, was obtained from all the women before participation. Ethics approval for this study was obtained from the Research Ethics Committee of Kobe University Graduate School of Health Sciences (reference no. 499-3).

HRQOL

HRQOL was assessed using the SF-12® Health Survey (SF-12), which is a well-validated questionnaire that measures people's comprehensive health statuses^{17,18}. The SF-12 has 12 questions in eight subscales—physical functioning, physical role, emotional role, bodily pain, general health, vitality, social functioning, and mental health. Three summary scores: Physical Component Summary (PCS), Mental Component Summary (MCS), and Role-social Component Summary (RCS) were calculated using the eight subscales¹⁷. The three summary scores ranged from 0 to 100. A higher score indicated better HRQOL. Four months postpartum, the participants' HRQOL was assessed, and the PCS, MCS, and RCS summary scores were studied as well.

Sedentary time

Sedentary time was assessed using the Japanese version of the Global Physical Activity Questionnaire version 2 (GPAQ)¹⁹. The GPAQ is a subjective measure that assesses the amount of physical activity in the recent one week. In this study, the information of sedentary time and total physical activity was used, through questions such as "Over the past seven days, how much time did you spend sedentary or reclining on a typical day?" In this study, after prefacing the question with "first month postpartum," the respondents were asked about their average amount of physical activity per week. Although this study assessed sedentary time one month after childbirth, the same survey also asked about current (4 months postpartum) sedentary time. This allowed respondents to compare the current time with the time at one month postpartum.

As there was no clear cut-off point, we divided the subjects into two groups using the third quartile of the sedentary time as the cut-off point, as in previous studies^{20, 21}.

The amount of total PA was also calculated using the GPAQ as the total weekly PA Metabolic Equivalents (MET-minutes/week, hereafter referred to as total PA.)

Demographic data

The city keeps medical records of infant health checkups conducted by the city. From those medical

records, we obtained information on the mother's age. A self-report questionnaire was used to determine the number of children and length of hospital stay after delivery, as well as the details on the mode of delivery (vaginal delivery or cesarean section) for each participant. The number of children was used to categorize women as either primiparas or multiparas.

Statistical analysis

The statistical analysis software R Studio (version 1.3.1073) was used, and the statistical significance level was set at 5%. Continuous variables were represented as their mean [standard deviation (SD)] or median [interquartile range (IQR)], and percentages were used for categorical variables. To compare the demographic data, participants were divided into two groups based on parity. Where appropriate, independent t-tests or the Mann-Whitney U test was used for continuous variables and the chi-square test was used for categorical variables. The association between sedentary time and HRQOL was evaluated through a univariate regression analysis, with PCS, MCS, and RCS at four months postpartum as the objective variables and the sedentary time one month postpartum as the explanatory variable. Multiple regression analysis was conducted using age, mode of delivery, and the amount of PA as confounding variables^{13,14}). We further examined the impact of sedentary behavior on HRQOL, based on parity. Partial regression coefficient and 95% confidence intervals (95% CIs) were calculated.

Result

Initially, 122 postpartum women were selected for this study. Five women were excluded because of their physical or mental illnesses: (Arthralgia, cracked femoral head, mastitis, Post Traumatic Stress Disorder, painless thyroiditis; four people because of missing data on HRQOL; and five women were rejected due to congenital diseases and/ or prematurity in their children. Therefore, the data of 108 postpartum women were analyzed (Figure 1).

The mean age for all participants was 31.5 ± 5.3 years, 92 (85.1%) women had vaginal births, and 51 (47.2%) women were categorized as primiparas. There were no differences in the lengths of hospital stays after delivery or total PA by parity. The median sedentary time among them was 6.0 [4.0 – 10.0] hours. Therefore, the study adopted 10 hours as the cut-off for sedentary time. The median HRQOL was 51.1 [45.5 – 55.5] for PCS, 55.1 [50.0 – 60.6] for MCS, and 52.0 [45.2 – 55.9] for RCS. Primiparas were younger (30.2 ± 5.4 vs. 32.7 ± 5.0 , $p = 0.015$) and had longer sedentary time ($8.0 [5.8 - 10.0]$ vs. $5.0 [4.0 - 8.8]$, $p = 0.0019$) (Table 1) than did the multiparas.

For all participants, the relationship between HRQOL and sedentary time was not significant. In primiparas, sedentary time for more than 10 hours was significantly associated with lower PCS (partial regression coefficient $B = -5.65$, 95%CI: - 10.16, -1.14); however, the relationship was not significant in MCS or RCS. In addition, none of the relationships were significant in multiparas (Table 2).

In primiparas, the relationship between sedentary time for more than 10 hours and PCS was

significant even after adjusting for age, mode of delivery, and total PA as confounding variables ($B = -5.47$, 95%CI: -10.45, -0.48) (Table 3).

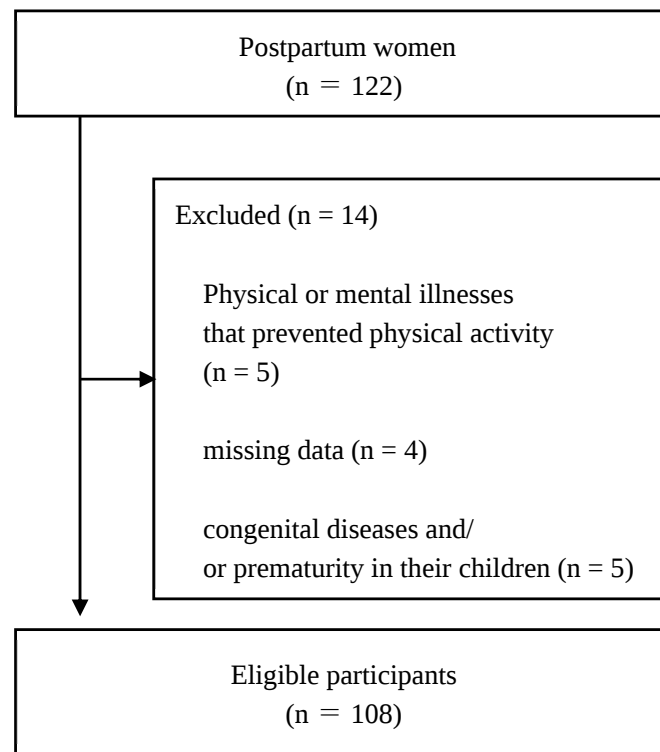


Figure1. Participant selection flowchart

Table1. Demographic Data of the Participants Based on Parity

Characteristics	Overall (n = 108)	Primiparas (n = 51)	Multiparas (n = 58)	<i>p</i> -value
Age (years)	31.6 ± 5.3	30.2 ± 5.4	32.7 ± 5.0	0.013
Vaginal birth	93 (85.3)	45 (88.2)	48 (82.8)	0.59
Length of hospital stay (days)	5.8 (1.4)	5.9 (1.0)	5.8 (1.5)	0.32
Total PA (MET-minutes/week)	0.0 [0.0 - 120.0]	0.0 [0.0 - 120.0]	0.0 [0.0 - 300.0]	0.60
Sedentary time (hours)	6.0 [4.0 - 10.0]	8.0 [5.8 - 10.0]	5.0 [4.0 - 8.8]	0.0019
Sedentary time > 10 hours	35 (32.1)	21 (41.2)	14 (24.1)	0.090
HRQOL				
PCS	51.1 [45.5 – 55.4]	49.6 [45.5 – 54.8]	52.4 [47.0 – 55.6]	0.23
MCS	55.3 ± 6.9	55.8 ± 7.4	54.5 ± 6.5	0.25
RCS	52.0 [45.3 - 55.9]	49.6 [45.4 – 56.7]	52.5 [45.1 – 55.5]	0.51

Means ± standard deviation (SD) or median [Interquartile range (IQR)], the number of persons (%) are shown.

Age and MCS were tested by the unpaired t-test,

Sedentary time, Total PA, PCS, and RCS by the Mann-Whitney U test,
mode of delivery, Sedentary time > 10 hours by the chi-square test.

Sedentary time > 10 hours: more than 10 hours sedentary time for the first month postpartum

HRQOL: health-related quality of life PCS: physical component summary

MCS: mental component summary RCS: role-social component summary

Table2. A Single Regression Analysis of HRQOL and Sedentary Time Based on Parity

	PCS		MCS		RCS	
	B	95%CI	B	95%CI	B	95%CI
Overall	-1.51	-4.85, 1.84	-0.13	-2.96, 2.72	-0.13	-3.75, 3.48
Primipara	-5.65*	-10.16, -1.14	-1.70	-5.91, 2.51	0.010	-4.92, 5.12
Multipara	4.03	-0.88, 8.93	1.05	-3.00, 5.10	-0.95	-6.52, 4.62

* p < 0.05

B: partial regression coefficient CI: Confidence Interval

PCS, Physical Component Summary; MCS, Mental Component Summary;

RCS, Role-social Component Summary

Table3. A Multiple Regression Analysis of PCS and Sedentary Time in Primiparas

	B	95%CI
Sedentary time > 10 hours	-5.47*	-10.45, -0.48
Age	-0.18	-0.63, 0.27
Mode of delivery	-0.21	-4.11, 3.68
Total PA	0.0012	-0.00091, 0.0033

* p < 0.05

Adjusted R-squared: 0.089

B: partial regression coefficient CI: confidence interval

PCS: physical component summary

Sedentary time > 10 hours: more than 10 hours sedentary time for the first month postpartum

Discussion

This study investigated the relationship between the sedentary time one month postpartum and the HRQOL four months postpartum and examined the difference in this relationship based on parity. Sedentary time of more than 10 hours per day was associated with lower PCS in primiparas, but not among all the subjects and multiparas. This is the first study to investigate the relationship between prolonged sedentary time and HRQOL in postpartum women.

In this study, the mean PCS score was 51.1, which was lower than the national standard value of 53.9 and 53.1 for women in their 20s and 30s, respectively¹⁸⁾. A cohort study revealed that the PCS two months postpartum was also below the national standard value²²⁾. Therefore, a lower PCS score in this study was reasonable, and it may have been caused by postpartum physical symptoms such as fatigue, headaches, musculoskeletal problems, mastitis, and perineal pain that affected the women's self-rated health²³⁾.

In this study, sedentary time was significantly longer for primiparas. As the intensity of PA differed by parity²⁴⁾, this study's findings were consistent with the previous study. It is likely that sedentary time was also shorter for multiparas who were caring for both newborns and older children²⁵⁾. In addition, the

median sedentary time was 6 hours, and 32% of all participants were sedentary for 10 hours or more. The average sedentary time for Japanese housewives is reported to be four hours²⁶⁾. Another study reported that 10% had 10.5 sedentary hours or more in the general population²⁷⁾. These studies indicate that the early-postpartum women in this study had longer sedentary times than did the general population. This is likely due to a decrease in PA because they receive support from family members during their early postpartum period¹¹⁾. In addition, the pain caused by perineal injury, which is experienced by approximately 80% of postpartum women and is particularly common among primiparas^{28,29)}, may have affected daily activity, including walking^{30, 31)}. Thus, both social and physical factors may have caused the prolonged sedentary time.

This study indicates that, for primiparas, prolonged sedentary time is associated with lower PCS. In the general population, sedentary time is also associated with physical health¹⁶⁾. Decreased metabolic activity and delayed wound healing are factors that influence this association. Prolonged sedentary time decreases low-intensity PA, which leads to reduced energy expenditure and decreased metabolism³²⁾. As lack of PA delays wound healing³³⁾, prolonged sedentary time may delay wound healing in the perineum.

Postpartum lower back pain and fatigue levels may cause the differences in parity. For the general population, sedentary behavior is associated with the intensity of lower back pain³⁴⁾. Postpartum lower back pain is more prevalent than the common back pain^{35,36)}, and sedentary time is associated with lower back pain, especially in primiparas³⁷⁾. Therefore, sedentary time in primiparas might cause persistence or enhancement of lower back pain. Furthermore, sedentary behavior in women significantly increases fatigue²⁵⁾ and primiparas experience more subjective fatigue, compared to multiparas³⁸⁾. Prolonged sedentary time may intensify the fatigue level of primiparas, which in turn affects their physical health.

Prolonged sedentary time in primiparas in their first month postpartum was associated with poor physical health. Most of the PA from pregnancy to 12 months postpartum involved low-intensity activity³⁹⁾, and the World Health Organization guidelines recommend replacing sedentary time with PA, including light-intensity PA⁴⁰⁾. The immediate damage caused by pregnancy and childbirth differs from person to person^{23, 41)}, and opportunities to go out are more limited¹¹⁾. Therefore, there is great demand for individualized exercises that can be done at home, replacing sedentary time with PA. In the current health guidelines for pregnant women and postpartum mothers in Japan, the percentage of "exercise guidance" offered is the lowest, at 6.7% of the total⁴²⁾. The HRQOL of postpartum women may be improved with the help of physical therapists who encourage PA according to the women's daily life situations, suggesting the need for interventions for postpartum women. Furthermore, it is necessary to question conventional practices. Particularly in Asia, there is still a strong belief that physical activity should be discouraged in the early postpartum period. First, evidence against such findings needs to be built, and information and education based on this evidence needs to be provided.

Limitations

This study has several limitations. First, the data were obtained from a single local authority, resulting in a small sample size. Second, confounding factors, such as body mass index, health status of the child and family support were not considered. Further larger cohorts of studies measuring multiple confounders for generalization, are required to examine this relationship. Third, this study did not collect information on low back pain, fatigue, and family support at 1 month postpartum. Therefore, the mechanism by which sedentary time is associated with HRQOL in the early postpartum period was not clarified. Fourth, there is a recall bias because sedentary time during the first month postpartum was subjectively based on the women's recall at four months postpartum. Therefore, we could not investigate any causal relationship. A longitudinal study should be conducted to examine the stratification of PA intensity using objective measures such as accelerometers and pedometers. The presence of physical activity impairment, one of the exclusion criteria, was also obtained through subjective responses. Thus, the validity of the exclusion criteria is not certain and the results may be overestimated or underestimated.

Conclusion

Prolonged sedentary time was associated with lower PCS in primiparas. Increasing daily light-intensity PA and decreasing sedentary time in the early postpartum period may lead to better HRQOL in primiparas.

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Conflicts of interest

The authors did not receive support from any organization for the submitted work.

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