CASE REPORTS

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Aerobic physical exercise and prolactin levels in blood during breastfeeding in woman with Hashimoto's thyroiditis – A case report

Aerobno fizičko vežbanje i nivoi prolaktina u krvi tokom dojenja kod žene sa Hašimoto tireoiditisom

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Abstract

Introduction. The World Health Organization (WHO) exclusively recommends breastfeeding for the first six months of the newborn life. Many factors affect milk production. Physical exercise can significantly affect prolactin secretion in the blood. **Case report.** A respondent in this study was a primipara (33 years old) diagnosed with Hashimoto's thyroiditis and a singleton pregnancy. During pregnancy and after the childbirth, she continued with light to moderate physical exercise. During the first six months after the childbirth, the light to moderate intensity aerobic exercise had no negative impact on the blood level of prolactin and growth and development of the child. **Conclusion.** In this case study, light to moderate intensity aerobic exercise had no negative impact on the level of prolactin in the blood during the first six months after the childbirth in a woman with Hashimoto's thyroiditis.

Key words:
breast feeding; hypoparathyroidism; prolactin; exercise.

Apstrakt

Uvod. Svetska zdravstvena organizacija (SZO) preporučuje isključivo dojenje tokom prvih šest meseci nakon rođenja novorođenčeta. Mnogobrojni su faktori koji utiču na proizvodnju mleka. Fizičko vežbanje može značajno uticati na lučenje prolaktina u krvi. **Prikaz slučaja.** Ispitanica u ovoj studiji bila je prvorotka (33 godine) sa dijagnostikovanim Hašimoto tireoiditisom i jednoplodnom trudnoćom. U trudnoći i nakon porođaja nastavila je sa kontinuiranim vežbanjem lakog do umerenog intenziteta. Ustanovljeno je da ovakvo vežbanje, tokom prvih šest meseci nakon porođaja, nije imalo negativni uticaj na nivo prolaktina u krvi i rast i razvoj odojčeta. **Zaključak.** U ovoj studiji slučaja, aerobno vežbanje lakog do umerenog intenziteta nije imalo negativnog uticaja na nivo prolaktina u krvi tokom prvih šest meseci nakon porođaja kod žene sa Hašimoto tireoiditisom.

Ključne reči:
dojenje; hipotireoidizam; prolaktin; vežbanje.

Introduction

Breastfeeding is considered the most optimal nutrition of the newborn in the first months of his/her life [1]. The two major world organizations (World Health Organization – WHO and the United Nations Children's Fund – UNICEF) exclusively recommend breastfeeding during the first six months of the child's life, and possibly longer [1–3].

Due to insufficient information about the importance of natural nutrition, many women stop breastfeeding much earlier and switch to the artificial nutrition of their newborns [1]. In the world, the number of exclusively breastfeeding children up to the age of six months is 38%, while in Serbia this number was only 13.7% in 2010 [1].

Many factors have an effect on the secretion of breast milk. The main reasons why a mother can get into a state of losing milk are sudden weight loss, irregular diet, stress, or exposing to great physical effort [4–7]. Due to the justified fear of losing milk, many women give up recreational exercise after delivery [3, 8]. However, the ability to breastfeed primarily depends on the health status of the woman.

Maintaining proper lactation is significantly influenced by the functioning of the thyroid gland [9]. Any thyroid disorder may have a negative impact on breastfeeding, especially if the woman is exposed to a high physical burden [9]. In addi-

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tion, increased physical effort can lead to thyroid hormone disorder [10, 11].

Earlier studies were less concerned with the impact of high intensity exercise on the possibility of successful breast feeding in women athletes or in women with some chronic illness [6, 9, 12]. Some studies point out that high intensity exercise did not have a negative impact on breast feeding [12, 13,]. It is assumed that the examined women compensated for increased energy consumption due to exercises with higher intake of nutrients, thus excluding the possibility of loss of lactation. Besides, these studies point out that the research was performed on a small number of women who were previously physically active, so the results cannot relate to the general population [13].

Although it is known that the ability to breast feed is very important, as well as the number of feedings *per* day, it is very important that a woman who exercises after a delivery does that in a proper and safe manner [6, 7, 11, 14]. In this case study, a six-month physical exercise of a woman who has recently given birth was monitored. The significance of the study is reflected in the continuous moderate intensity aerobic exercise that continued after delivery, as well as the effect of exercise on lactation in the subject with diagnosed thyroid disorder.

Due to insufficiently studied impact of exercise training during the breast feeding period, there is fear of an early loss of milk in some women [5, 15]. Additionally, there are even less number of studies on the impact of high-intensity exercise in female athletes or women with certain chronic disease [9, 12, 13].

Case report

A respondent was a female athlete (33 years old) diagnosed with Hashimoto's thyroiditis and a singleton pregnancy. Her physical parameters were: height 176 cm, body weight 58.7 kg (before the pregnancy), 68.7 kg (before delivery) and 62.9 kg (after delivery). She recreationally competed in triathlon and marathon for many years. During pregnancy and after the childbirth, she continued with light to moderate intensity running. Hormone therapy in pregnancy was increased from 25 μg to 50 μg of levothyroxine sodium (Tivoral®, Galenika, serbia).

The research covered the period of six months after the childbirth. Before pregnancy and a week after the childbirth, changes in physical status were observed (Table 1). Volume of training was recorded on a daily basis (Figure 1). Analyses of the physical status and prolactin level in the blood were performed at the end of every month during the study period (Table 1). Two weeks after the childbirth, she started running. The number of trainings (3–7 times *per* week) depended on: leisure time, care of the newborn, housework and other obligations. The volume of training (5 km, 7 km or 10 km *per* day) was controlled by fitness monitor (Garmin Forerunner 310 XT). Regular checks of hormones (prolactin and thyroid hormones) and other parameters of the blood (iron, glucose, cortisol, leukocytes and feremia) were carried out in laboratory conditions.

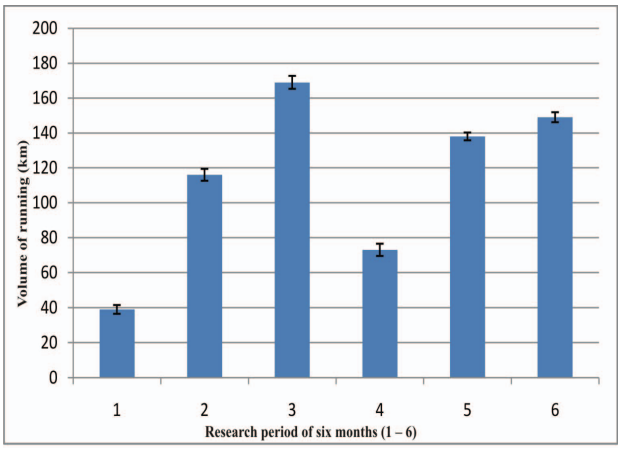

Fig. 1 – Mean values and standard deviation of the monthly volume of training during the first six months after delivery.

During the research period (2nd to 5th month), the respondent reported health problems with symptoms: dry skin, itchy elbows, as well as the whole body itching that was more intense at night. During this period, there was a feeling of "empty breast" and lower secretion of milk. In the analysis of the health condition, tests showed negative results to: *Candida*, parasites in the stool and *Helicobacter pylori* (IgA and IgG).

Table 1
Morphological status and prolactin values in blood of respondents measured during pregnancy and postpartum

Period of measurement	Parameters			
	body weight (kg)	BMI (kg/m^2)	body fat (%)	prolactin (102–496 μU/mL)
40th week of pregnancy	68.7	22.3	25.5	2,798
After delivery				
*	62.9	20.5	20.3	4,095
1	61	19.8	18.3	1,130
2	55	17.9	14.5	823.5
3	56.9	18.5	16.2	934.7
4	56.9	18.5	16.9	616.1
5	57	18.5	16.8	699.3
6	56.7	18.5	16.9	907.8

*** one week after delivery; 1–6 – measurement at the end of the month during the study period.**
BMI – body mass index.

Table 2

Values of thyroid hormones measured during the first six months after delivery

Thyroid hormones	1	Reference values	2	Reference values	3	Reference values	4	Reference values
TSH	3.76	(0.27–4.20) mU/L	< 0.01	(0.35–4.94) mU/L	12.67	(0.27–4.20) mU/L	/	/
T3	/	/	2.5	(1.0–2.7) nmol/L	/	/	/	/
T4	17.21	(12–22) pmol/L	129	(60–160) nmol/L	/	/	9.1	(9.1–19.1) pmol/L

*** 1–4 – number of measuring.**
TSH – thyroid stimulating hormone; T3 – triiodothyronine; T4 – thyroxine.

Ultrasound of the upper abdomen showed no pathological changes in internal organs. A blood test showed: optimal values of serum iron 10.6 μmol/L (reference range, 6.6–26.0 μmol/L), glucose 4.2 (reference range, 4.1–6.1 mmol/L) and evening cortisol 122.30 (reference range, 64–327 nmol/L), low values of leukocytes 3.5 × 10^9/L (reference range, 4.0–10.0 × 10^9/L) and high values of morning cortisol 837.9 nmol/L (reference range, 171–536 nmol/L). This blood variable was measured by calorimetric method. Low thyroid-stimulating hormone (TSH) level was measured (Table 2). Pruritus was diagnosed but therapy treatment was not determined. During this period, the respondent continued with the usual training.

Without specific therapy treatment, itching did not disappear. With a sudden loss of weight (7.9 kg), the following symptoms appeared: a sense of cardiac palpitations (observed: blood pressure – 110/60 mmHg; pulse rate – 80/min), a common nervousness, headache, insomnia and increased hunger. Ultrasonography of the thyroid gland showed normal shape and size of the thyroid gland, of slightly inhomogeneous echotexture, mediocre CD signal, without focal changes, dimensions: right lobe – 13×16×47 mm, left lobe – 14×15×46 mm. Hyperthyroidism was diagnosed. Hormone therapy was reduced to 25 μg of levothyroxine sodium. By applying a certain treatment after 3–4 weeks there have been the following changes: increased appetite, weight gain, feeling of abdominal fullness and bloating. Hormone therapy was increased to 50 μg of levothyroxine sodium. After 10 days, the itching disappeared completely.

During the study period, the respondent exclusively breast fed her child. In the period of six months, a menstrual cycle was not established. The respondent did not change diet during pregnancy, as well as after the childbirth, except in the low milk supply. In the days of so-called "lactation crisis" (the fourth month after pregnancy), the respondent continued running, but with the reduced scope and at a lower intensity. After a while, she completely stopped running for a period of two weeks. During the period of complete rest, she increased fluid intake (about 2 L) and the caloric value of the food in the course of the day. The respondent pointed out that, during the period of relactation, she rested with the baby during the day. The number of breastfeedings was increased to about 10–12 times during 24 hours. When necessary, she used a manual breast pump.

During this period of six months after the childbirth, decline in the value of the hormone prolactin below the lower reference value has not been recorded. After the re-establishment of sufficient quantities of milk for breastfeeding, the respondent increased training volume and continued with regular light to moderate intensity running.

Growth and development of the child was monitored through regular medical checks. The smallest increase in the baby's body weight was noted in the period of the mother's health problem (the third and fourth month after the birth). During the period of six months, the baby doubled body weight at birth (from 3,060 g to 7,000 g) and grew 16 cm (from 48 cm to 64 cm).

Discussion

For the physically active women with a thyroid disorder who want to breastfeed successfully, it is necessary to control the thyroid hormones regularly, as well as to adapt the hormone therapy to the body needs [9]. Increased physical activity can cause a disorder of thyroid hormones [10, 11]. In addition, due to the increased energy consumption, it is essentially to stay nourished and hydrated properly [13, 14]. Studies have shown that continuous moderate aerobic exercise has no adverse effects on the quantity and composition of breast milk, but a certain amount of lactic acid is confirmed which may be a cause of sour flavor and rejection of baby breastfeeding [16, 17]. Some studies show that there was no significant difference in the nutritional value of milk among physically active and sedentary women [4, 6, 8, 13].

Besides, studies that tracked changes in the level of prolactin in the blood in physically active women have shown that moderate aerobic exercise has no harmful effects on the secretion of this important hormone responsible for successful lactation [4, 5, 13, 15]. Disrupting secretion of breast milk may be caused by rapid weight loss due to malnutrition or increased physical effort and stress [4–7]. During pregnancy, prolactin level in the blood of a pregnant woman gradually increases and reaches the maximum value just before giving birth, while this value decreases after the established lactation [11, 18].

In this case study, although prolactin levels were above the upper limit of the reference value during the study period of six months, short-term loss of milk probably can be considered the cause of the changes in the thyroid gland, as well as unadjusted training activities [6, 9, 12, 13, 15].

Changing hormone therapy, increased caloric intake and proper hydration had a positive impact on overcoming

minor problems related to breast feeding [5, 9, 14]. Sudden weight loss had no negative impact on the level of prolactin in the blood. Although some studies note that production of breast milk largely depends on the mother's level of nourishment/body mass index, the above mentioned case can be considered a situation where the body reacts to protect lactation in women with a small percentage of fat in the body [6, 13, 15]. With the increased physical activity and energy deficit, the body responds in the form of increase of the hormone responsible for the maintenance of lactation [15]. Some elite female athletes doing aerobic sports state that despite minor problems they successfully breastfed [13, 12]. Although the impact of frequent breast feedings on the level of prolactin in the blood has not been fully confirmed, it is considered that the number of breastfeedings during the day can have a significant impact on milk production [13, 4].

While increased physical activity has a positive effect on weight loss after childbirth, gradual weight loss has not negative impact on the level of prolactin in the blood during lactation [4, 6]. It is very important to continue with the controlled and proper exercise during pregnancy and after delivery [11, 14]. Reduced cortisol and glucose levels in the blood during the lactation period are expected [7]. In this case, regular blood analysis showed normal levels of blood glucose, reduced values of leukocytes and increased values of the morning cortisol.

Conclusion

In a woman with Hashimoto's thyroiditis light to moderate intensity aerobic exercise had no negative impact on the blood level of prolactin during the first six months after the childbirth.

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