PREGNANCY AND DELIVERY OF ELITE COMPETITIVE ATHLETES

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ABSTRACT

The current data suggest that a moderate level of exercise on a regular basis during a low risk pregnancy has minimal risk for the fetus and beneficial metabolic and cardio-respiratory effects for the exercising pregnant women.

Pregnancy in the elite competitive athletes will require some alteration in the training schedule.

The aim of the present study is to investigate the influence of the period of pregnancy and giving birth in elite athletes.

Methodology and Results: 84 elite athletes from different 14 sports have been surveyed. 23,5% of them stop active training right after getting pregnant. More of them continue training until the 3rd month of the pregnancy-36,3%, 7% train until 4th month, 13,2% train until 5th month and 20% continue training until 8th month and even longer.

Most of the athletes discontinue their participation in competitions-78%, but few of them-22% continue their competitive activity until the 4th month of pregnancy.

The pre-birth contractions, the labor until the actual delivery of the baby last average 6-8 hours and in 65% of the cases birth is natural. 35% of the athletes gave birth to their babies by Sectio Ceasarea.

Postpartum about 50% of the athletes stop with their sports carrier due to various personal and social reasons. Those who continue go back to their training programs in the period between 2-10 months after giving birth. It is very important that 90% of those athlete's mark achievements better than those before pregnancy.

Conclusion: We can firmly state that elite sport is not an obstacle for normal maternity and physiological functioning of female athletes. On the contrary maternity can have positive influence on the sports achievements.

Key words: pregnancy, delivery, competitive athletes

INTRODUCTION

The increasing number of female athletes, training and competing at high level in almost all kinds of sports rises many questions about the opportunity for maternity of these young women. The optimal fertile age period for women coincides with their peak performance for many athletes. On the other hand, a lot of female athletes feel hesitation if they could go on training and competing, when they become pregnant (Bo., Artal et al, 2016) pregnancy often gives a sign for reaching the end of their competitive career.

But pregnancy is a natural state of the female organism and elite athletes with an uncomplicated pregnancy can continue exercising, although some adjustments in the intensity and the kind of activity have to be made (Bo, Artal et al, 2018).

Pregnancy is associated with significant anatomical, hormonal, metabolic, cardiovascular and pulmonary adaptive changes (Artal, O'Toole, 2003). The most obvious of these changes is weight gain. The increased weight in pregnancy, especially in front of the body shifts the center of gravity. This

places stress on the joints and muscles, especially those of the pelvis, low back, hips and knees. Because of the anatomical changes, pregnant women typically develop lumbar lordosis, which contributes to the very high prevalence (50%) of low back pain in pregnant women. Balance may be affected by changes in posture, predisposing pregnant women to loss of balance and increased risk of falling.

The increased levels of oestrogen and relaxin during pregnancy cause increased ligamentous laxity. This makes the joints more mobile and at risk of injuries, such as strains and sprains (Artal, O'Toole 2003). Pregnancy induces profound alteration in the maternal hemodynamics.

The blood volume is increased up to 50% during pregnancy and also the number of erythrocytes increases up to 18%. Maternal stroke volume increases by 10% by the end of first trimester of pregnancy and is followed by a 20% increase in heart rate during the second and third trimesters. Mean arterial pressure decreases with 5-10mm Hg by the middle of the second trimester and then gradually increases back to pre-pregnancy levels. The decreased mean

arterial pressure is the result of increased uterine vasculature and uteroplacental circulation (Artal, O'Toole, 2003; Perales et al, 2016)

The cardiovascular changes associated with body posture is an important consideration for pregnant women. After the first trimester the supine position results in relative obstruction of the venous return and therefore decreases the cardiac output. For this reason, supine positions should be avoided as much as possible during rest and exercise.

And also, motionless standing is associated with a significant decrease in cardiac output, so this position should be avoided (Artal, O'Toole, 2003; Bo, Artal et al, 2016). In concern with the respiratory system a structural adaptation is the expansion of the rib cage during pregnancy which would assist breathing. The minute ventilation increases by almost 50% largely as a result of increased tidal volume.

The aerobic capacity is increased during pregnancy (Mottola et al, 2006). These cardiorespiratory adaptations realized mainly to supply the growing fetus with oxygen and nutrients are potentially useful for training and sports presentation after the giving birth of the baby. Another favorable point is that women's oestrogen levels are higher during pregnancy- oestrogen stimulates the release of the hormone serotonin, which essentially minimizes the fatigue and makes exercise less painful. All these useful adaptations theoretically could improve athletic performance after having a baby (Bo, Artal et al, 2017; Dipietro et al, 2019) For high level athletes a thorough clinical evaluation should be conducted to ascertain that there are no medical or obstetrical reasons either to avoid or to modify training schedule (Bo, Artal et al, 2018).

Absolute contraindications, relative contraindications and warning signs, specific to elite athletes exercising in pregnancy have been adapted from the American College of Obstetricians and Gynecologists (ACOG) guidelines. According to the American Congress of Obstetricians and Gynecologists exercise during pregnancy is safe and encouraged. They recommend at least 150min per week of moderate intensity aerobic activity

for women with uncomplicated pregnancies (although contact sports, scuba diving, sky diving, hot yoga or activities with risk of falling have to be avoided) Exercise has minimal risks for the fetus and helps prevent some risks of pregnancy including gestational diabetes, pre-eclampsia and hypertension. It can also help mitigate weight gain and improve post-partum recovery. (Artal, Hopkins, 2013; Mottola et al, 2018; Barakat et al, 2015; Bo, Artal et al, 2018)

The aim of the present study is to investigate the influence of the period of pregnancy and giving birth in elite Bulgarian athletes

METHODOLOGY

84 elite athletes from different 14 sports have been surveyed through anonymous questionnaire and personal interview. The sports which the investigated athlete's practice are with different kind of motor abilities, loading characteristics and specific peculiarity.

All the athletes have long-lasting sports career- between 4 and 25 years before getting pregnant. The average age of their first delivery is 25 years, but it varies in a wide range between 20 and 35 years. Some of the athletes have second child which was born between 2 and 4 years after the first.

RESULTS AND DISCUSSION

An important information appears for how long the training process continues after the athletes got pregnant. 23,5% of them stop active training right after getting pregnant. More of them continue training until the 3rd month of pregnancy-36,3%, 7% keep training until 4th month, 13,2% train until 5th month and 20% continue training until 8th month and even longer. (Figure 1).

Most of the athletes did not participated in competitions during the pregnancy-78%, but part of them- 22% continued their competitive activity until the 4th month of the pregnancy (Figure 2) It deserved to be mentioned the good mood and self-confidence of the pregnant athletes and the lack of serious health problems between them. According to their opinion the pregnancy of the active women goes on easier, the delivery is easier, the recovery is quicker and postpartum depressions almost do not exist with them.

Figure 1. *Active training after getting pregnant*

Figure 2. *Participation in competitions after getting pregnant*

There are different data about the labor process of athletes in the literature. Most authors accept that the delivery lasts less because of the strong abdominal muscles, but often appear ruptures of the pelvic floor muscles due to their rigidity. (Bo, Artal et al, 2016; Davenport et al, 2019).

The results of our investigation show comparatively not long period of delivery- the pre-birth contractions, the labor until the actual delivery of the baby lasted between 3 and 8 hours. In 65% of the athletes the birth is natural, while in the remain 35% is with Cesium Section, realized due to obstetrical or personal reasons.

The weight of the new born babies varies between

2850 and 3800gr and does not differ significantly from the weight of the new-borns of non-athletes, although there are data in the literature that competitive athletes give birth to healthy and vital babies, but with lower weight from those of the non-athletes mothers. (Barakat et al, 2009; De Oliveira et al, 2012; Bo, Artal et al, 2016)

Although the positive motivation for training about 50% of the competitors stop with their sports career postpartum due to various personal and social reasons. Those, who continue go back to their training programs between 2 and 10 months after the delivery (Figure 3).

Figure 3. *Beginning of exercise after giving birth*

Of particular interest is the information how much the athletes, who became mothers succeed to return to their level of training fitness before pregnancy and to reach their previous sport successes. It is remarkable that 90% of the athlete's mark achievements better than those before pregnancy. Some of them even realize their greatest sports successes and medals after they became mothers. (Figure 4). One of the most significant transitions that females

can face, are those related to pregnancy and motherhood. But female athletes are not obliged to end their sports career after a pregnancy. The positive adaptations of the female body confirm that athletes can increase their physical capacity during and after pregnancy (Everson et al, 2014; Bo, Artal et al, 2017). There are examples of female athletes, who demonstrated an ability to perform at high level during and after a pregnancy.

Figure 4. *Sport achievements after giving birth*

Tennis superstar Serena Williams famously won the Australian Open in 2017 while eight weeks pregnant and returned in the big sport after becoming a mother of her daughter. Beach volleyball player Kerri Walsh Jennings won her 3rd gold medal at the 2012 London Olympics while 5 weeks pregnant. Canadian curler Kristie Moore won a silver medal at 2010 Olympics while 5 months pregnant. Malay-

sian shooter Nur Mohamed Taibi competed at 2012 Olympics while eight months pregnant, and Alyssia Montano ran 800-meter race at 2014 US Track and Field Championship while eight months pregnant. And they were not the only ones. There are also examples of high-level athletes who returned in big competitions after motherhood. Snowboard Cross athlete Zoe Gillings-Briar competed in her

4th Olympics after she became a mother. Jess Ennis Hill also returned to winning form after the birth of her son. Paula Radcliffe returned to competition and won 2007 New York Marathon 10 months after giving birth of her daughter. Olympian champion Jo Pavey won 10000m gold at 2014 European Championship 10 months after giving birth to her second child. The cross-country Olympian Kikkan Randall won her 3rd world championship medal-a bronze in February 2017 ten months after giving birth to her son. The famous Kerri Walsh Jennings had two children after winning gold medals at 2004 and 2008 Olympic Games in beach volleyball and won her 3rd gold medal at London Olympic Games 2012 while five weeks pregnant with her 3rd child.

In 2015 the International Olympic Committee gathered sixteen experts from around the world to explore research and recommendations for athletes during pregnancy and after childbirth. Their subsequent report released in 2016 found that it is completely safe for women to keep training as they were before- so long as they adapt to the needs of their own body as it changes. According to Dr. Raul Artal co-author of the report of the IOC 2015 for elite athletes there are no concerns to continue training and competing. He recommends that they keep their heart rates around 145-160 beats per minute for athletes aged 20-29 years and 140-156 beats per minute for ages 30-39. These rates are based on 80% of an athletes' VO₂ max (maximal oxygen uptake) and vary, depending on baseline fitness level. In addition, athletes should consult with their obstetricians. Dr. Artal also states that pregnancy is not contraindication for competition. (Davis, Artal, 2019; Bo, Artal et al, 2018) According to Dr. Kari Bo, co-author of the report of the IOC 2016 every athlete and every pregnancy are different and all is individual and also depends of the kind of sport, so the evaluation have to be done personally, precisely and completely. (Bo, Artal et al, 2018)

CONCLUSION

Based on our investigation concerning the pregnancy and the delivery of high-level Bulgarian athletes and with agreement with the current scientific data and the recommendations of the International Olympic Committee, we can firmly state that elite sport is not an obstacle for normal maternity and physiological functioning of female athletes. On the contrary maternity can have positive influence

on the sports achievements and even can boost a sports career.

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