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Mini Review

A Current Discussion: Does Fertility Improves with Physical Exercise?

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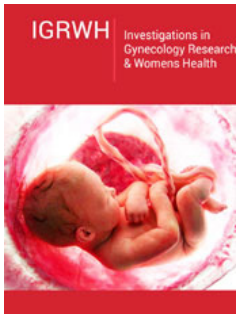

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Abstract

Science has been defined to boost human fertility and health for so many years till it is clearly understood. Debates have been going on for the possible interaction between more knowledge on the human self and a better life. Whenever it is possible to prove that human fertility is as crucial as life cycle, then it is definitely provable to discuss whether human fertility improves by regular physical exercise. In this study, it has been questioned if it is possible to improve female fertility by physical exercise. The examples are taken as real-life situations simulations, and the chaotic discussions are proved by various studies.

The study has been divided by expectant mother ability and strength behavior when they are under different level physical exercise intake. They are evaluated by regular physical exercise level. Their ability after regular physical exercise is tested and the results are taken by discussion. Then, it is stated whether expectant mother is more prominent for fertility with regular physical exercise. The study is crucial to open a new way for the expectant mothers in today's era who would like a healthy pregnancy and birth. Future assimilation studies could be done to examine which level physical exercise is beneficial for which age group pregnancy.

Introduction

Human beings have a common status among the other species of living being. The evolution of humans is considered still thoughtless and debated across the world. Some species can breed as a colony, for instance some animals like lions and some plants like carnivorous plants. Hyporacy of environment does not change for the animals and the plants. However, human beings can be physically or physiologically hurt, damaged or go out of the chamber of environmental life cycle. Whether it can be a lifelong concern for the adults to conceive or not, it should be noted that infertility is as obvious as females who would not like to face problems during pregnancy or postpartum.

Owing to the scientific procedures and developments, innovation in technology and with the endeavor of science people, today it is so simple for the females regarding normal or abnormal expectant mother to give birth. Regarding mental readiness for pregnancy, the first factor for this beautiful journey must be physical readiness. One of the external factors which affects pregnancy is regular physical exercise. In this review, it is examined whether infertility decreases by physical exercise or not.

The World Health Organization (WHO) defines PA as "any physical movement produced by skeletal muscle that consumes energy", and recommends more than 150min of high PA per week to reduce the risk of reproduction (Can Exercise Affect Your Fertility? We Have the Answers, retrieved from https://chapelhillobgyn.com/blog/exercise-affect-fertility/) [1]. When it is properly prescribed during lifelong process of a human being, PA is an inexpensive and universal "medication" with minimal side effects; PA is a veritable "home pharmacy" that we always carry with us. PA appears to reduce infertility through biologic and physiologic mechanisms by strengthening antioxidant defenses and reducing inflammation of bodily fluids, organs, and tissues. Some randomized controlled trials have reported a therapeutic effect of PA on infertility that acts through systemic effects such as increased immune function, insulin resistance, and circulating sex hormones.

Method

To be open, every female human being is different regarding BMI and exercise regularity and intention. Female athletes, elite or recreational, can be more productive when compared with their normal counterparts of expectant mother. Thanks to today's information circulation and social media, expectant mothers are more knowledgeable than previous eras. They are searching for ways to have a healthy birth without the risk of miscarriage. Expectant mothers go to fitness centers to get exercise and meet with dieticians throughout their process of motherhood.

Moreover, it would be strong evidence to state the role of vitality hormone and nutrition. While nutrition plays a major role in this discussion, eating protein diets may boost fertility also. A neatly valuable example is that protein diets release hormone Sirtuins which are formerly known as class III Nicotinamide Adenine Dinucleotide (NAD+) dependent Histone Deacetylases (HDACs) Tatone C et al. [2]. Sirtuin Functions in Female Fertility: Possible Role in Oxidative Stress and Aging). To open up the issue more, it could be defined that strong experimental evidence supports the notion that SIRT1 plays a crucial role in sensing and modulating the cellular redox status thus providing protective effects in cells and tissues exposed to oxidative stressors in vitro and in vivo. SIRT1 is able to directly deacetylate key proteins involved in the cellular stress response, such as forkhead box O (FoxO) transcription factors. Evidence for the interaction between SIRT1 and FoxO was first provided by Brunet et al. van der Horst et al. showed that mammalian SIRT1 was able to bind $FOXO_4$, thus catalyzing its deacetylation in a NAD dependent manner, while Kobayashi et al. demonstrated that $FOXO_4$ activity was suppressed or enhanced by SIRT1 inhibitor or its activator, respectively Carla T et al. [2]. Sirtuin Functions in Female Fertility: Possible Role in Oxidative Stress and Aging) [2]. Later, many other authors observed that SIRT1-related cellular protection against oxidative stress can be achieved by upregulating key antioxidant enzymes, such as Catalase (CAT), Mitochondrial SOD (MnSOD), and peroxiredoxin, through forkhead box O- (FoxO-) dependent mechanisms.

Several experiments demonstrated that SIRT1 prevents replicative senescence in mammalian cells. Conversely, the selective knockdown of SIRT1 at early passage was found to slow down cell growth, thus accelerating significantly cellular senescence (Xu et al.). Sirtuin Functions in Female Fertility: Possible Role in Oxidative Stress and Aging) [2].

The crucial role of hormone Sirtunin in expectant mother fertility should not be underestimated when it is clearly seen in other factors. For the matter of exercise, the regularity, intensity and rate can be optional and diverse. As it is seen Table 1 below, various exercise can counterpart with various expectant mothers.

Table1: Comparing exercise intensities using various methods of measurements.

Exercise intensity	METs	HR	Borg rating of Perceived Exertion (RPE; 6-20 scale	Subjective Experience	Examples
Light	2.0-2.9	30%-39%HR reserve 57%-63% max HR	9-11	Movement that does not cause adults to sweat or breathe harder; easy to talk	Walking slowly (2.0METs) Housework while standing (2.0-2.5 METs)
Moderate	3.0-5.9 METs	40%-59%HR reserve 64%-76% max HR	12-13	Causes some sweating and shortness of breath; can only speak short sentences	Brisk walk: 5.0 METs Bicycling (leisurely): 5.5-6.0 METs
Vigorous	≥6.0 METs	60%-89%HR reserve 77%-955% max HR	14-17	Causes considerable sweating and shortness of breath; can only speak 1-2 words	Swimming (leisurely): 6.0 METs Running 9.65km/h: 9.5-10 METs

HR= Heart Rate; max =Maximum; MET= Metabolic Equivalent; RPE; Rating of Perceived Exertion.

Heart rate reserve is calculated by taking the theoretical maximum HR (208- [0.7 × age]) and subtracting the resting HR (4). MET values refer to the energy expenditure, wherein 1 MET is at rest and 5 METs refer to expending 5 times the amount of energy a person would sitting at rest (2).

Result

A number of studies have examined the effects of PA on fertility in healthy women attempting to conceive as it is seen at Table 2 below. For example, an early study by De Souza et al. (2003) compared runners running a mean (±SD) of 32km/wk with sedentary women, tracking hormonal markers and menstrual cycle characteristics over 3 consecutive cycles. In this study, 58% of regular runners were found to show menstrual cycle abnormalities, including anovulation and an insufficient luteal phase (defined as a luteal phase of <10 days or a peak urinary pregnanediol level of <1.5 Creatine-adjusted μg/mL for ≥3 midluteal days) *vs*. only 9% of sedentary women. Furthermore, among the ovulatory cycles with a sufficient luteal phase, luteal progesterone levels were lower among runners than among sedentary women. Runners were also found to show lower levels of estrone glucuronide, a urinary metabolite of estradiol, in the late follicular phase, suggesting an inhibitory effect of exercise on follicular maturation. Although the total weekly distance run was not associated with any of the parameters assessed, the net energy balance (i.e., caloric intake minus caloric expenditure), assessed using daily dietary records and activity monitoring, was. Specifically, cycles that were categorized as ovulatory were associated with a lower energy balance than those with other types of cycles. In contrast, cycles characterized by an insufficient luteal phase were found to be associated with an energy balance similar to that of ovulatory menstrual cycles Mussawar M et al. [3] The effect of physical activity on fertility: a mini review).

Table 2: The effects of physical activity in healthy females.

Note: BMI = Body Mass Index; N/A = Not Applicable; PA = Physical Activity.

Investigator, Year	Participants	Study Design	Intervention and PA assessment	Control Group	Main Findings
Williams et al.	34 Premenopausal eumenorrheic women with a normal BMI, all aged between 18 and 30y	Randomized controlled trial	3 Intervention group, all involving 3 mo of supervised vigorous aerobic exercise 5d/wk, ranging from 20-75 min, and controlled diet to manipulate caloric intake. Group 1 experienced a mild exercise calorie deficit; group 2 experienced a moderate exercise calorie deficit, and group 3 experienced a severe exercise calorie deficit	The same exercise regimen as intervention groups without an energy deficit	85% of the moderate and severe energy deficit groups experienced at least 1 luteal phase defect in the 3 intervention menstrual cycles. In contrast, only 1 participant in the control group and 1 in the mild deficit group did A trend toward higher rates of anovulation (35%) in moderate and severe deficit groups (p=0.7) relative to other groups (0)
De Souza et al.	35 eumenorrheic women	Cross sectional	Comparison of sedentary	N/A	Of the 3 menstrual cycles

Discussion

A comprehensive and a concluded meta-analysis provided support for an inverse relationship between PA and risk of infertility, revealing that a moderate to high PA level significantly reduced the overall risk of infertility and was a common protective factor. In addition, limited evidence suggested that compliance with international PA guidelines greatly lowered the risk of infertility (RR = 0.58, 95% CI 0.45-0.74; I2 = 0.0%) Fangfang X et al. [4], corresponding author and Jiatuo Xu corresponding, Association between physical activity and infertility: a comprehensive systematic review and meta-analysis). It can be clearly seen that regular Physical Activity fosters development and normal growth, improves mood, function, and sleep quality, and lowers the risk of chronic diseases. In the field of reproduction, also, the new WHO guidelines recommend that pregnant women achieve at least 150 min/week of vigorous-intensity aerobic exercise to help increase their chances of becoming pregnant, and to also improve their overall health.

Conclusion

It is totally clear that Sirtunin hormone which is sustained by protein intake to body is profoundly sustaining a healthy and balanced lifestyle reducing aging in the cells boosting up fertility hormones for a comfortable expectant mother. To add, regular physical exercise whose levels are changeable throughout the BMI of the females and the progress of the fertility rates are described as possible riskers for the infertility.

In the future, investigators need to determine the frequency, optimal dosage, and duration of PA required to effectively reduce the risk of infertility. Scientific evidence can support that infertility of human beings cannot be possible anymore thanks to the harmonization between physical activity and pregnancy. Being a mother and an expectant mother should be easy as it seen exactly [5,6]. Factors that affect motherhood such as age, smoking, personality, personal earnings, social and intimate relations should not be underestimated as well. Beyond this factor physical activity can boost energy for the females who follow a regular fitness program and a healthy lifestyle.

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