



Contents lists available at ScienceDirect

Women and Birth

journal homepage: www.elsevier.com/locate/wombi



The influence of physical activity in water on sleep quality in pregnant women: A randomised trial[☆]

R. Rodríguez-Blanque^{a,b}, J.C. Sánchez-García^{a,b}, A.M. Sánchez-López^{a,b}, N. Mur-Villar^{a,c},
M.J. Aguilar-Cordero^{a,b,d,*}

^a Grupo de Investigación CTS 367, Plan Andaluz de Investigación, Junta de Andalucía, Spain

^b Departamento de Enfermería, Facultad de Ciencias de la Salud, Universidad de Granada, Granada, Spain

^c Universidad de Ciencias Médicas de Cienfuegos, Cienfuegos, Cuba

^d Complejo Hospitalario Universitario de Granada, Granada, Spain

ARTICLE INFO

Article history:

Received 8 December 2016

Received in revised form 16 May 2017

Accepted 16 June 2017

Available online xxx

Keywords:

Pregnant women

Sleep

Physical activity

Exercise

BMI

ABSTRACT

Introduction: Sleep is a physiological state of self-regulation. The international classification of sleep disorders now includes as a new category those occurring during pregnancy. Regular physical activity is known to improve the quality of life, one aspect of which is sleep quality. During pregnancy, physical activity is decreased but should not be eliminated, as studies have reported a high correlation between sleep disorders and the absence of physical activity. Regular physical exercise during pregnancy, whether performed in water or out of it, provides greater control of gestational weight gain. Furthermore, the reduced weight gain during pregnancy, as a result of physical exercise, is associated with greater physical resistance to the demands of childbirth, combats the fatigue caused by pregnancy and reduces back pain. All of these outcomes tend to enhance sleep quality, among other beneficial effects.

Objective: To determine whether, in pregnant women, there is an association between moderate-intensity physical activity in an aquatic environment and sleep quality.

Material and methods: A randomised clinical trial was conducted with a sample of 140 pregnant women aged 21–43 years, divided into two groups; Intervention Group and Control Group. The women were recruited in the twelfth week of gestation and took part in the [Study of] Water Exercise in Pregnancy programme from week 20 to week 37. Sleep quality was evaluated in the first and third trimesters of pregnancy, using the Pittsburgh Sleep Quality Index questionnaire.

Results: The Mann–Whitney U test showed that the results obtained were statistically significant ($p < 0.05$). In the Intervention Group, 44 of the women (65.67%) were classified as “poor sleepers” versus 62 women (92.54%) in the Control Group.

Conclusions: The [Study of] Water Exercise in Pregnancy method improves the quality of sleep in pregnant women, both subjectively and in terms of latency, duration and efficiency.

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Statement of significance

Problem or issue

The lack of knowledge about the benefits of exercise in pregnant women is a factor that contributes to poor sleep quality during pregnancy.

[☆] Trial registration: The trial is registered at the US National Institutes of Health (ClinicalTrials.gov) under the title “Physical Activity in Pregnancy and Postpartum Period, Effects on Women”. Number NCT02761967.

* Corresponding author at: Departamento de Enfermería, Facultad de Ciencias de la Salud, Universidad de Granada, Avda/de la Ilustración s/n, CP: 18071, Granada, Spain.

E-mail address: marijaguilar@telefonica.net (M.J. Aguilar-Cordero).

What is already known

Regular physical activity in all phases of life, including pregnancy, promotes health benefits. Pregnancy is an ideal time for maintaining or adopting a healthy lifestyle.

What this paper adds

Evidence that moderate physical exercise in water, following the SWEP method, improves sleep quality in pregnant women, enhancing the duration, latency and regular efficiency of sleep.

1. Introduction

Sleep is a physiological state of self-regulation. In contrast to wakefulness, sleep is characterised by low levels of physiological activity, including blood pressure and respiration, and by a reduced response to external stimulation.

Among many population groups, average sleep duration has decreased, due to occupational and other demands. This, together with the fact that women play an increasingly significant role in the work force but with no decrease in domestic responsibilities, has led in some cases to sleep needs being seen as less important by women.

During women's lives, a series of physiological states are experienced, including puberty, menstruation, pregnancy and the menopause, all of which may be related to alterations in sleep patterns and an increased risk of sleep disorders.¹

Sleep disorders during pregnancy may begin with excessive somnolence, and sometimes progress to severe insomnia. Occasionally, there may be nightmares, night terror and even psychosis after childbirth.¹

About 70% of pregnant women undergo sleep disorders,² and this condition is more frequent among those who have not previously given birth.³ Various studies have observed that pregnancy can influence the development of sleep disorders.^{4–6}

Such disorders can affect both the quality and the duration of sleep, reflecting the major hormonal, physiological and behavioural changes experienced during pregnancy. Among such are elevated levels of oestrogen, progesterone, prolactin and cortisol, provoking irritability, absence of concentration, apathy and bad moods.¹

Some hormonal changes are specific to each trimester of pregnancy. Thus, in the first trimester, many women suffer sleep disorders due to increased levels of the gonad hormones (progesterone), which cause greater fragmentation of sleep and increased day-time somnolence. During the first trimester, too, physiological symptoms may be experienced, such as nocturia, low back pain, nausea and vomiting, all of which contribute to greater sleep fragmentation. This disorder of sleep quality in the early stages often precedes a higher level of depressive symptoms in the final stage of pregnancy.⁷

In the third trimester, sleep disorders increase, in quality and quantity, with rising levels of gonad hormones, oestrogen and progesterone. Sleep is also impaired by the discomfort caused by foetal growth, together with nocturia, low back pain, gastro-oesophageal reflux, foetal movements and nocturnal cramps.⁸

In Spain, studies have reported a prevalence of 20% of obesity and 53% of overweight among pregnant women,^{9–11} and that excessive weight gain during pregnancy is prejudicial to health during pregnancy, during birth and after birth.

During pregnancy, obesity aggravates sleep disorders, heightening the presence of snoring and provoking somnolence during the day,^{12,13} together with obstructive sleep apnea,¹⁴ as well as

other problems associated with gestational weight gain in the third trimester. During pregnancy, this situation may be compounded by a decrease in physical activity.^{10,15–17} Various studies have reported the importance of physical exercise during the gestational period and the promotion of a healthy life style.^{18,19} Regular physical activity during pregnancy improves sleep duration and quality.²⁰ Aquarobic-based exercise programmes have been shown to enhance the preparation and physical development of pregnant women. At the same time, well-being, mood and sleep are normalised, daily physical activity and work capabilities are increased and pregnancy-related complications may be prevented.²¹ In this context, the SWEP method may be recommended as a strength and endurance-building exercise programme, performed in an aquatic environment and specially designed for pregnant women,¹⁸ thus helping achieve the above-mentioned benefits. When this exercise is performed in an aquatic environment, many advantages are obtained; submergence in water decreases body weight and facilitates movement, which prevents overloading the joints and back. In addition, when exercising in water, attention can be focused on controlling the rhythm, phases, volume and type of respiration.¹² In view of these considerations, we propose a study based on moderate physical exercise performed in an aquatic environment, aimed at improving the sleep quality of pregnant women, from weeks 20 to 37 of gestation.

2. Objective

To determine whether, in pregnant women, there is an association between moderate-intensity physical activity in an aquatic environment and sleep quality.

3. Material and methods

3.1. Design

This randomised clinical trial was 'open-label', i.e., both the study subjects and the researchers were aware of the nature of their participation, and was conducted in accordance with the CONSORT standards, published in 2010.¹³ It was approved by the Research Ethics Committee for the province of Granada (CEI-Granada). All the women gave signed informed consent prior to taking part in the study, as required by the provisions of the Declaration of Helsinki, reviewed by the WMA Secretariat with regard to Informed Consent, on 5 May 2015.¹⁴ The study is registered on the ClinicalTrials.gov website under the number NCT02761967.

The research team member responsible for recruitment to the study made initial contact with 364 pregnant women. Of these, 224 were excluded from the study; 122 because they did not meet the inclusion criteria; 82 refused to participate in the project; and 20 expressed a fear of physical exercise in water, or mentioned lack of time or other reasons for non participation.

Finally, 140 women aged between 21 and 43 years formed the study population, which was divided into two groups, IG and CG. Of these women, 137 completed the questionnaire in the first trimester, while three left the study because their birth took place before 36 weeks of gestation.

In the IG, three women were excluded because mistakes were made in completing the questionnaire. Thus, the final study sample was composed of 134 women, 67 in each group. The recruitment took place over a period of two weeks, in the first half of April 2016, at the Health Clinics of the Granada-Metropolitan Health District, which forms part of the Andalusian Health Service. The researcher responsible for this phase of the study contacted the women by telephone to inform them about the study. Those who expressed

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