

Systematic review of the effects of physical activity during pregnancy

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Summary

There are many queries regarding about the effects of physical activity during the gestation period. The aim of this study is to conduct a systematic review in order to find out the effectiveness of physical activity during pregnancy, as well as to determine which are the most beneficial. For this purpose, several databases have been used, such as Scopus, Scielo, Elsevier, ScienceDirect, ResearchGate, Springer Link, World Wide Science, MedlinePlus, Dialnet and Google Scholar using the keywords "physical activity" and "pregnancy". The documents selected were 79, including articles and theses in Spanish and English published between 2004 and 2020. To carry out the descriptive analysis, eight variables have been extracted: research objectives, mean age of pregnant women, data collection tools, planning of physical activities performed, gestational period in which physical activities begin, the most frequent mode of delivery, intensity of activities and results of the study. After that, they have combined with each other, in order to obtain outcomes. The outcomes indicate that the main objective of the studies is to evaluate the effect of physical activity on the health of the mother over thirty years of age and that the period in which it is most commonly put into practice is from the first and second trimesters onwards. In conclusion, physical activity has very positive effects on pregnant women, as it does not alter the health of either the mother or the child. Likewise, the most beneficial are activities programs with moderate intensity.

Key words:

Exercise. Health.
Pregnancy. Systematic review.

Revisión sistemática sobre los efectos de la actividad física durante el embarazo

Resumen

Existen dudas sobre los efectos de la actividad física durante el periodo de gestación. El objetivo del presente estudio es realizar una revisión sistemática para conocer la efectividad de la actividad física durante el embarazo, así como para determinar cuáles son las más beneficiosas. Para ello, se han empleado diversas bases de datos, como son Scopus, Scielo, Elsevier, ScienceDirect, ResearchGate, Springer Link, World Wide Science, MedlinePlus, Dialnet y Google Scholar, utilizando las palabras claves "actividad física" y "embarazo". Los documentos seleccionados han sido 79, entre los cuales destacan artículos y tesis en español e inglés publicadas entre 2004 y 2020. Para llevar a cabo el análisis descriptivo, se han extraído ocho variables: objetivos de la investigación, edad media de las embarazadas, instrumentos de recogida de datos, planificación de las actividades físicas realizadas, periodo gestacional en el que comienzan las actividades físicas, parto más frecuente producido, intensidad de las actividades y resultados del estudio. Tras ello, se han combinado entre sí, con la finalidad de obtener unos resultados. Estos indican que los estudios tienen como principal objetivo evaluar el efecto de la actividad física sobre la salud de la madre en mujeres mayores de 30 años y que el periodo en el que más se pone en práctica es del primer y segundo trimestre en adelante. Se puede concluir que la actividad física tiene efectos muy positivos en las gestantes, no alterando la salud de la madre y del bebé. Del mismo modo, las más beneficiosas son la realización de actividades físicas programadas con una intensidad moderada.

Palabras clave:

Ejercicio. Embarazo.
Revisión sistemática. Salud.

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Introduction

The World Health Organisation defines physical activity as “any bodily movement produced by skeletal muscles that requires energy expenditure¹.” Sport provides many health benefits, preventing the appearance of disease such as cancer, high blood pressure, diabetes or strokes¹.

Over history, it has been determined that exercise during pregnancy can lead to a simpler delivery². Even so, there are some aspects yet to be resolved by science². This explains why many doctors and Sports Science graduates continue researching the effects of physical activity during pregnancy².

During pregnancy, women try to follow advice from a range of experts, such as doctors or philosophers, in an attempt to bear the nine months as best they can². This includes physical activity during pregnancy and all the points to consider on this matter: time, intensity and type².

Doing physical activity during pregnancy helps reduce weight gain over the 9 months, even among women with obesity³. In addition, it can be useful to strengthen muscles to avoid back pain, increase agility and achieve better adaptation to the woman’s weight gain³.

A doctor must determine whether some physical activity can be done during pregnancy, as this requires no pathology that might affect the life of the mother or the baby⁴. These sports include any intended to strengthen the musculoskeletal system and improve two fundamental systems: cardiovascular and respiratory⁴. Therefore, it is advisable for pregnant women to do aerobic activities which are recommended by specialists. Static bikes and treadmills are also recommended⁴. Finally, running is also possible although this is only advised for women who already ran before their pregnancy, and a doctor should monitor them continuously⁴. In addition to the above, it has been demonstrated that physical activity in water has many benefits for pregnant women, aided by their floatability. Consequently, swimming is recommended for them⁵.

Only a very low percentage of women do physical activity during their pregnancy: 15.1%⁶. The reasons for this include the perception of physical activity as a risk for both the mother and the baby⁶. However, women who want to exercise for the nine months of their pregnancy enjoy better health than those who do not⁵. Consequently, pregnant women should do some physical exercise and thereby prepare for the delivery, as long as there are no contraindications for this⁷.

Exercising during pregnancy might incur risks such as low birth weight for the baby⁸. This might be due to the low quantities of glucose reaching the foetus as the mother is consuming a considerable amount during exercise⁸. In addition, when doing physical activity, the blood flow between the uterus and the placenta drops, so the foetus receives less oxygen and nutrients from the mother⁹. Even so, most research determines that this does not represent a risk for the baby⁹.

Physical activity has very positive effects when it comes to giving birth, as it reduces the probability of surgery. Furthermore, it helps

mothers control their pain and breathing during delivery, which is very important if the birth lasts for several hours¹⁰. In the same way, women who are in good physical condition or who do some exercise during pregnancy feel less pain when it comes to giving birth¹⁰. In addition, they benefit from recovering sooner from the delivery, suffer less incontinence and their circulation becomes more efficient¹⁰. In the same way, physical activity produces stronger musculature, and better pelvic mobility, creating greater flexibility. This helps when opening the uterus, favouring a natural delivery¹⁰.

The general aim of this study is to systematically review physical activity and pregnancy. Specifically, it aims to find out how effective physical activity is in pregnancy and determine which type is most beneficial.

Material and method

Design

Documents were selected for the systematic review from the following databases: Scopus, Scielo, Elsevier, ScienceDirect, ResearchGate, Springer Link, World Wide Science, MedlinePlus, Dialnet and Google Scholar. The review took place in March and April 2020.

Identification and selection of studies

Articles and dissertations were selected for this study. The latter were divided into two types: Master’s and doctoral dissertation. In terms of language, documents were selected in both Spanish and English.

The keywords were *actividad física* and *embarazo*. And the terms in English are *physical activity* and *pregnancy*. Boolean operators *and/ly* were used to combine them. Finally, a total of 79 documents were selected from the different databases, published between 2004 and 2020.

Inclusion and exclusion criteria

A series of inclusion and exclusion criteria were considered to perform the systematic review. The inclusion criteria were as follows:

- Articles or dissertations published between 2004 and 2020.
- Articles or dissertations written in Spanish or English.
- The articles or dissertations should contain a methodology section.
- The main topic of the documents should be physical activity and pregnancy.

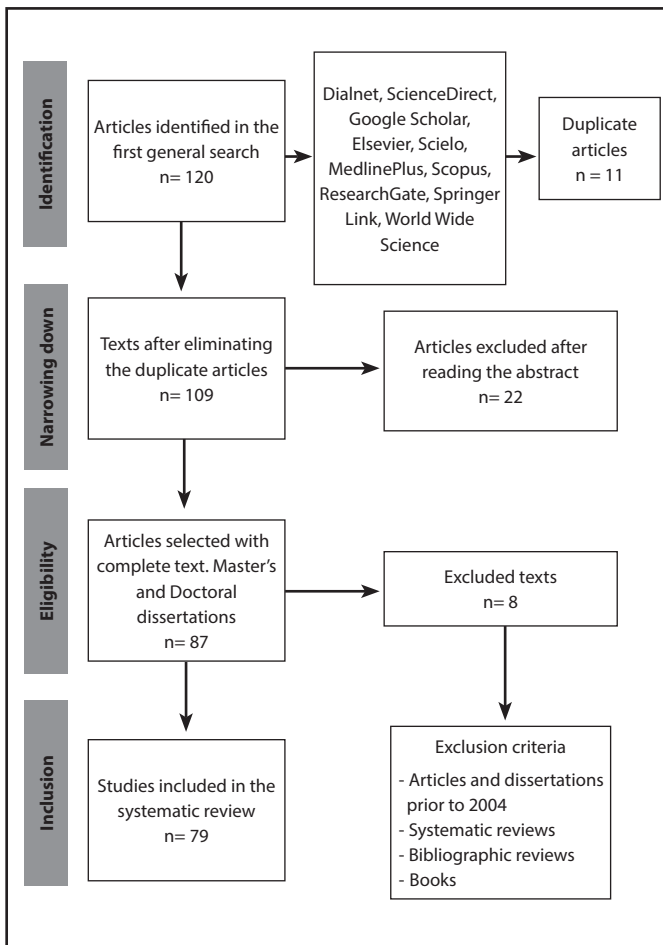
Furthermore, books, reports, systematic reviews and biographical reviews were excluded.

Figure 1 shows a flow chart with the selection process for the documents for systematic review.

Variables

The following variables have been extracted from the various documents being analysed: research objectives, average age of the pregnant women, data collection instruments, planning for the physical activity performed, gestational period when the physical activity began, most

Figure 1. Flow chart.



Source: Compiled by author.

frequent type of delivery, activity intensity and results of the study. They were all analysed using a database created in Microsoft Excel.

The variables analysed and the categorisation system used to organise each of them properly are explained below:

- Research objectives: this determines what the study is pursuing. Considering objectives that are proposed in the different research projects, the following categorisation has been determined:
 - Evaluate the effect of PA on the mother's health.
 - Evaluate the effect of PA on the health of the mother and the baby.
 - Evaluate the effect of PA on the baby's health.
- Average age of the pregnant women: given that the average age of the pregnant women was around 30 years old, the categorisation system is as follows:
 - Under 30 years old.
 - Over 30 years old.
- Data collection instruments: the following categorisation system was specified to analyse this variable:
 - Observation: when the instrument used was observation.

- Questionnaire: when the data collection instrument was a questionnaire.
 - Interview: when the data collection instrument was an interview.
 - Medical review: when the data collection instrument was a medical review.
 - Questionnaire and medical review: when the data collection instrument was a questionnaire and a medical review.
 - Interview and questionnaire: when the data collection instruments were a questionnaire and an interview.
- Planning the physical activities: the following categorisation has been used to classify the different activities performed in the different studies:
 - Programmed: the subjects carry out a programme with varied or specific physical activity that was designed for the actual study.
 - Semi-programmed: the subjects perform varied or specific activities that have been recommended by professionals or specialists, such as walking, running or swimming, although without following a programme of physical activity imposed by the study.
 - Not programmed: the subjects perform varied or specific physical activities autonomously.
 - Intensity of the physical activity: the following categorisation system was specified to analyse this variable:
 - Light: subjects carry out low intensity daily activities, such as walking to the shops, housework, walking to work, etc.
 - Moderate: subjects carry out medium intensity activities, such as aerobics, swimming, static bike, fast walking, etc.
 - Gestational period when the physical activity began: the following categorisation system was specified to analyse this variable:
 - First trimester onwards: the physical activity began in the first trimester.
 - Second trimester onwards: the physical activity began in the second trimester.
 - Third trimester onwards: the physical activity began in the third trimester.
 - First trimester: the physical activity was specifically done in the first trimester.
 - Second trimester: the physical activity was specifically done in the second trimester.
 - Most frequent type of delivery: considering the most frequent delivery in each of the studies, the categories for this variable were determined as follows:
 - Vaginal: the baby comes out of the maternal uterus through the vagina.
 - Undetermined: when the study does not indicate the type of delivery.

- Study results: to classify the contents of this variable, due to the high number of documents analysed, the following categorisation was considered:
 - Physical activity reduces the duration of delivery.
 - Physical activity improves the mother's health during pregnancy and/or the postpartum period.
 - Physical activity does not affect the mother and/or the baby's health during pregnancy and/or the delivery.

Objectives

The objectives proposed in relation to the variables are as follows:

- Determine the purpose of the various investigations (research objectives).
- Find out the average age when the research was carried out (average age of the pregnant women).
- Indicate the most-used instruments to perform the studies (data collection instruments).
- Determine the gestational period when physical activity is most often implemented and the most frequent planning (gestational period and planning of the physical activity).
- Determine which intensity of physical activity most favours a vaginal delivery (most frequent delivery and intensity of physical activity).
- Determine which intensity of physical activity favours the best results (intensity of the physical activity and results obtained).

Results

The results obtained after analysing the different variables presented in the previous section are shown below.

Descriptive analysis of the objectives

Regarding the 65 documents analysed, it was observed that the research projects mainly focus on evaluating the effects caused by physical activity during pregnancy on the health of the mother given that more than 75% of the studies analysed set this as their main objective.

Descriptive analysis of the average age of pregnant women

The average age of the pregnant women in over half of the 63 documents examined is over 30 years old. The results concur with the latest data from 2018 from the National Statistics Institute (INE)¹¹, in which the pregnant women presented an average age of 31 years old (Table 1).

Descriptive analysis of the instruments used

Regarding the 79 documents analysed, it is observed that in more than 60% of the studies, the information compilation instrument used is the questionnaire or a combination of interview and questionnaire (Table 2).

Table 1. Analysis of the average age of pregnant women.

Average age of pregnant women	
Over 30 years old	55.6%
Under 30 years old	44.4%
General total	100.0%

Source: Compiled by author.

Table 2. Analysis of data collection instruments.

Data collection instruments	
Questionnaire	31.6%
Questionnaire and medical review	3.8%
Interview	17.7%
Interview and questionnaire	29.1%
Observation	10.1%
Medical review	7.6%
General Total	100.0%

Source: Compiled by author.

Descriptive analysis of the gestational period when the physical activity took place and planning of the physical activity

Considering the 70 documents analysed, a considerable increase can be appreciated among any that focus their attention on the activities carried out in the first and second trimester onwards with more than 90%. However, studies that focus on the activities developed during just one trimester and from the third onwards are less frequent. In addition, programmed activities stand out, with more than 70% (Table 3).

Descriptive analysis of the most frequent type of delivery and the intensity of physical activity

After analysing these variables, depending on the 21 documents analysed, it might be concluded that there is a major link between carrying out moderate intensity activities and a subsequent vaginal delivery. This determines that women who perform activities at this intensity demonstrate more physical capacity when it comes to giving birth, thereby leading to a much more natural, simpler delivery.

Descriptive analysis of the intensity of the physical activity and the study results

It has been demonstrated by almost 90% of the 63 studies analysed that it is moderate physical activity that gets the best results, benefiting and not affecting the health of the mother and/or baby during the pregnancy and/or the postpartum period. Therefore, it is determined that light physical activity does not obtain such positive results as for moderate activity (Table 4).

Table 3. Analysis of the gestational period and planning of the physical activity.

Gestational period when PA begins	Programmed	Semi-programmed	Not programmed	General total
First trimester	0.0%	0.0%	1.4%	1.4%
First trimester onwards	31.4%	1.4%	8.6%	41.4%
Second trimester	2.9%	0.0%	0.0%	2.9%
Second trimester onwards	35.7%	2.9%	12.9%	51.4%
Third trimester onwards	1.4%	1.4%	0.0%	2.9%
General total	71.4%	5.7%	22.9%	100.0%

Source: Compiled by author.

Table 4. Analysis of the physical activity intensity and the study results.

Study results	Light	Moderate	General total
Physical activity drops during the delivery	0.0%	3.2%	3.2%
Physical activity improves the mother's health during pregnancy and/or the postpartum period	6.3%	46.0%	52.4%
Physical activity does not affect the mother and/or baby's health during pregnancy and/or delivery	1.6%	42.9%	44.4%
General total	7.9%	92.1%	100.0%

Fuente: Elaboración propia.

Discussion

The two specific objectives proposed at the start of this study were to find out about how effective physical activity is in pregnancy and determine which type is most beneficial.

The average age of the pregnant women in the various documents analysed is over 30 years old, matching INE¹¹ data over the last decade.

On the other hand, the data suggest that performing moderate intensity physical exercise favours a natural delivery and reduces the probability of surgical intervention. The results of this systematic review match the study by Miranda and Navio¹², whose conclusions determine that physical activity reduces the chances of a C-section.

The physical activity in the various types of planning is not focussed on just one physical quality, many of the investigations under review indicate that they combine stamina, strength and flexibility exercises, given that they all generate different types of health benefits among pregnant women, both during pregnancy and during delivery.

The results attained in this research indicate that the greatest number of physical activities are implemented from the first and second trimester onwards. They follow the line of research carried out by Moreno¹³, where the conclusions determine that most of the published studies focus on pregnant women in the second trimester onwards.

In the same way, in relation to what is obtained in this study, where more than half the research projects carry out programmed physical

activity, Barakat *et al.*³ advocate for a supervised and planned physical exercise programme during pregnancy.

On the other hand, conclusions drawn by Sánchez-García *et al.*¹⁴, demonstrate that moderate physical activity obtains very positive benefits among pregnant women, coinciding with the results of this systematic review, where moderate intensity activities (aerobics, swimming, static bike, fast walking, etc.) stand out as opposed to light exercise, causing more positive effects. Furthermore, Perales *et al.*¹⁵ determine that aerobic physical activity during pregnancy improves some parameters of the cardiovascular system. In turn, Vázquez¹⁰ determines that a physical activity programme in water produces benefits in hemodynamic parameters and improves quality of life for pregnant women (body pain, general health and mental health).

Analysis of the documents included in this study determines that physical activity is beneficial for the mother's health during pregnancy and/or the postpartum period. This data does not differ from the conclusions obtained by Aguilar *et al.*¹⁶ and Puente *et al.*¹⁷, who show that women who set out to do physical exercise during the 9 months of pregnancy enjoy better health than women who do not.

Conclusions

Working from the study, it is possible to determine a series of conclusions according to the objectives proposed throughout it.

Firstly, it can be understood that most of the studies analysed have the main purpose of evaluating the effect of physical activity on the mother's health in women aged over 30 years old, where the questionnaire and the interview are the most frequently used information collection instruments.

It can be stated that, after having analysed the different documents, the gestational period where physical activity is most frequently implemented is the first and second trimester onwards, where programmed activities are particularly relevant. Furthermore, it is determined that there is a major link between carrying out moderate intensity activities and subsequently having a vaginal delivery.

Before drawing to a close, it should be highlighted that this systematic review contributes to the field of research, as it questions the current belief on the effects of performing physical activity during pregnancy.

Consequently, it would be interesting if future lines of research might focus on checking the type of planning for physical activity (programmed, semi-programmed or not programmed) that might obtain the most health benefits for pregnant women.

Regarding the limitations of this research, three can be mentioned: the limited size of the studies that meet the set inclusion criteria, the difficulty to extract common variables in the different documents, and the lack of specification on the type of physical activity performed.

Finally, based on the two specific objectives, it can be concluded that physical activity has very positive effects in pregnant women, not affecting the health of the mother and the baby. In the same way, the most beneficial is moderate intensity, programmed physical activity.

Conflict of interests

The authors do not declare any conflict of interests.

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