

# Physical activity in low risk pregnant women: a cross-sectional study

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## Abstract

**Objective.** The aim of this study is to analyze the quality and quantity of physical activity (PA) practiced by low-risk pregnant women before and during pregnancy.

**Design.** This cross-sectional study assesses the dietary habits, exercise habits and body mass index. We used an *ad hoc* health lifestyle multiple choice questionnaire. The data collection lasted 7 months, from the beginning of September 2018 to the end of March 2019.

**Population.** We recruited 175 Italian women with a singleton, low-risk pregnancy at 32-36 weeks of gestational age.

**Results.** In the periconceptional period, 52.6 % of women do not perform any PA. For the other 47.4% of women, the most practiced activities, both before and during gestation, are walking and swimming. Data on the sedentariness showed that about a quarter of the population remains inactive watching TV for more than two hours a day. Interestingly, the most statistically significant risk factor for sedentariness is the BMI > 25 kg/m<sup>2</sup>. Therefore, overweight or obese women are more likely to maintain a sedentary lifestyle during pregnancy.

**Conclusions and implications for the practice.** Our study highlighted a high rate of sedentariness in pregnancy, especially among overweight and obese women. Thus, it is important to undertake interventions aimed at informing pregnant women of various benefits that PA can bring. In particular, because of the significant association between sedentariness and BMI greater than 25 kg/m<sup>2</sup>, it results crucial to direct these recommendations particularly to overweight/obese pregnant women, addressing them to a healthy lifestyle. *Clin Ter* 2020; 171 (4):e328-334. doi: 10.7417/CT.2020.2235

**Key words:** pregnancy, low risk, physical activity, BMI, weight gain

## Introduction

Physical activity is defined as any movement caused by the contraction of skeletal muscles with consequent energy expenditure, it also includes recreational activities, those carried out during work and in domestic environment (World Health Organization, 2016).

Physical activity provides benefits at all stages of life, but also during pregnancy guaranteeing benefits for both the mother and the fetus. (World Health Organization, 2016; Haakstad, 2007) There are many studies that report various recommendations concerning physical activity during pregnancy.

The American College of Obstetricians and Gynecologists (ACOG) recommends practicing physical activity during pregnancy. Women with a low-risk pregnancy should be encouraged to perform aerobic exercise and strength-conditioning exercises before, during and after gestation, for 20 to 30 minutes of medium-to-intense physical activity a day, in agreement with the midwife and the doctor. Bed rest should only be recommended in rare cases. Moreover, pregnant obese women (BMI > 30kg/m<sup>2</sup>) should be encouraged to change their lifestyle, excluding a sedentariness and poor eating habits. Regular activity also helps to counteract postural disorders, walking, cycling, jogging or practicing yoga are examples of aerobic exercises suitable for pregnancy (ACOG, 2015). In 2008 the U.S. Department of Health and Human Services has established other guidelines for physical activity during pregnancy, at least 150 minutes per week of medium-intense aerobic activity (for example, fast walking) is recommended (U.S. Department of Health and Human Services, 2018).

The Italian guidelines for physiologic pregnancy defined by the Health Ministry in 2011, recommend that professionals inform pregnant women about the benefits and risks of moderate physical activity and which activities to choose or not (Ministero della Salute, 2011).

The correlation between physical activity during pregnancy and the lower incidence of pre-eclampsia has been described in some studies: Yeo and Davidge (2001), speculated that the adaptation of the body to regular exercise produces

an antioxidant effect that also decreases the incidence of preeclampsia (Yeo and Davidge, 2001). Two studies one in 2013 and one in 2014 theorize that physical activity before and during pregnancy decreases the risk of incidence of preeclampsia (Yeo, 2013; Aune, 2014).

In 2012, a systematic review shows the protective effect of physical activity on the development of preeclampsia by comparing: six case-control studies showing that physical activity produces a protective effect in the development of the aforementioned pathology (OR 0.77, 95 % confidence interval (CI) 0.64-0.91,  $p < 0.01$ ); ten prospective cohort studies showing no particular evidence (OR 0.99, 95% CI 0.93-1.05,  $p = 0.81$ ); a randomized study showing a protective effect on the development of preeclampsia in the stretching group (OR 6.34, 95% CI 0.72-55.37,  $p = 0.09$ ) (Kasawara, 2012).

Davenport, et al (2008), showed that walking (at a low intensity two or three times a week) lowers average glucose levels at the end of pregnancy and decreases the amount of insulin needed by women (Davenport, 2008). Slow walking has been demonstrated to be associated with a significant reduction in postprandial blood glucose levels in pregnant women (Nygaard, 2009) showing also a strict correlation between physical activity and gestational diabetes (De Barros, 2010).

#### *Weight Gain and Physical activity*

The first change that pregnancy brings to the mother's body is weight gain. In 2009, the Institute of Medicine (IOM) drafted guidelines for healthy weight gain during pregnancy, based on the pre-pregnancy body mass index (BMI) (Institute of Medicine, 2009). Physical activity, therefore, plays a fundamental role because it influences weight gain. In fact, being inactive during pregnancy increases weight gain (Doherty, 2006; Althuisen, 2009). Furthermore, a vegetarian diet in the first trimester, walking at least 30 minutes a day, and vigorous physical activity are inversely proportional to excessive weight gain (Stuebe, 2009).

#### *Labor and Delivery*

Physical activity during pregnancy also has effects on labor and delivery. A high periconceptional BMI and an excessive weight gain, have negative consequences on labor and delivery, increasing the number of obstetric interventions such as cesarean section or operative vaginal delivery, leading consequently to greater surgical and anesthetic risks compared to a normal-weight woman (ACOG, 2015; Doherty 2006). In 2014, the American Journal of Obstetrics & Gynecology published a systematic review of randomized controlled trials to understand how the performance of structured physical activity during pregnancy could improve labor and delivery and reduce the risk of caesarean section (Domenjoz, 2014).

#### *Low back pain and physical activity*

More than a third of pregnant women suffer from low back pain (Wang, 2004) and at least one fifth of pelvic pain, which may appear separately or together and usually increase with advancing pregnancy, interfering with work, daily activities and sleep. A meta-analysis carried out by Cochrane

in 2015 reported moderate-quality evidence regarding the simultaneous presence of low back pain and pelvic pain. A land-based exercise, in many forms, tends to reduce sick leave caused by these two types of pain (Liddle, 2015). A randomized study, instead, states that the physical activity carried out in the water during the second half of the gestation significantly reduces the intensity of low back pain relieving the sacral loin pain (Kihlstrand, 1999).

Scientific evidences on the possible association between physical activity in the workplace and maternal-fetal outcomes are limited. In a cohort study performed on Danish women it is reported a relationship between the daily weight lifting during pregnancy and preterm birth: more specifically, lifting heavy loads ( $> 20$  kg) more than ten times a day, is associated with an increased risk of preterm birth (Runge, 2013). New national guidelines have been set by the National Institute for Occupational Safety and Health to determine the maximum weight to be lifted for pregnant women (MacDonald, 2013). A study describes the benefits of Yoga on pregnancy (includes physical posture, breathing and meditation) (Narendran, 2005). During pregnancy it is often recommended to carry out exercises in water that has a symbolic meaning, because it recalls the element in which the fetus grows and develops, (i.e. the amniotic fluid). Salvesen et al. (2004) found that women who practiced physical exercises present a lower risk of incurring an expulsion period of more than 60 minutes (Salvesen, 2004).

#### **Objective of the study**

This observational cross-sectional study aims to research the benefits of physical activity in low-risk pregnant women, from 32-36 weeks.

#### **Materials and methods**

Using an ad hoc questionnaire composed of 53 multiple choice questions, we compared the pre-pregnancy lifestyle and physical activities, with those carried out during the first, second and third trimester of gestation. The questionnaire presents open-ended and multiple-choice questions investigating health status and lifestyle, working activity, type of movement, domestic activities, hobbies, sports and recreational activities.

We analyzed the relationship between pre-pregnancy body mass index, weight gain during pregnancy and physical activity. Moreover, we looked at the factors that interfere with physical activity during pregnancy such as: the recommendations of midwives, obstetricians and general practitioners related to physical activity during pregnancy, the home-support of the women, cultural barriers and personal motivation.

#### *Population*

The sample includes 175 low-risk singleton Italian-speaking pregnant women at gestational age between the 32nd and the 36th week. Women presenting the following characteristics were excluded: multiple pregnancy; not

understanding of the Italian language; foreign women; history of pre-gestational diabetes mellitus or congenital fetal diseases.

The questionnaire was distributed at the Obstetrics Unit of the Policlinic-University Hospital of Modena. An informed consent was obtained by women who accepted to participate to the study. The data collection lasted 7 months, from September 2018 to March 2019.

### Statistical analysis

Data was entered in the data processing programs Microsoft Excel and SPSS, after numerical codification of the questions and answers collected.

The analysis of the data has been divided into two types:

Descriptive statistics: frequencies and percentages related to the variables studied;

Logistic regressions: to identify the factors that can influence a given dependent variable.

### Descriptive statistics

Frequencies and percentages were identified relating to the following variables: school attendance; employment status; percentage of working hours before pregnancy and in the various trimesters of pregnancy; pre-pregnancy body mass index and weight gain during pregnancy; eating habits before and during pregnancy; back and pelvic pain during pregnancy; urinary incontinence; physical activity during the day, excluding working hours (domestic activities during pregnancy); parity; physical activity before pregnancy, in the first, second and third trimesters; type of physical activity (aerobic or anaerobic); frequency and duration of the training carried out before pregnancy and in the various trimesters of pregnancy; recommendations received from health professionals during pregnancy; degree of sedentariness during pregnancy (hours spent watching TV and hours of sleep).

### Results

Among the 175 enrolled women, the average age was 33.2 years. A medium-high education level was reported by 55% of women, who studied more than 13 years. The 69.7% of our sample had a sedentary work (122 women), while the 18.9% resulted to be unemployed and the 10.8% practiced a non-sedentary work.

Daily working hours before pregnancy, in the first, second and third trimesters were accounted for the analysis and divided into 2 groups: women working more than 50% (considered full-time) and those working less than 50%, including in this group unemployed, leave or non-working categories such as students. The percentage of working hours/day decreases with the progress of pregnancy in the group of women working full-time, while it surprisingly tends to increase in the group of women working initially less than 50% (Fig. 1).

The percentage of missing responses was 3.4% before pregnancy, 8% in the first and second trimesters and 10.3% in the third one.

Furthermore, we evaluated the type of work carried out during pregnancy (i.e. lifting heavy weights). Percentages have been calculated based on women who declared to work when they filled up the questionnaire (46.3% of the total sample).

The 64% of the sample declared that they have no other dependent children, against the 34% who claims to have at least one of them (59 out of 175). The missing response rate is 2.3% (4 out of 175). In our sample, 123 pregnant women fall in the normal weight (70.3%), 25 overweight (14.3%), 14 obese (8%) and 12 underweight (7%). The average weight gained during pregnancy resulted 11.4 kg. More specifically, women who were underweight gained 11.2 kg; normal weight women gained 11.7 kg; overweight women increased their weight of 11.3 kg and obese gained 9.1 kg during pregnancy.

By relating the weight gain with the pre-pregnancy BMI category, we report that the 47.4% of women was in the

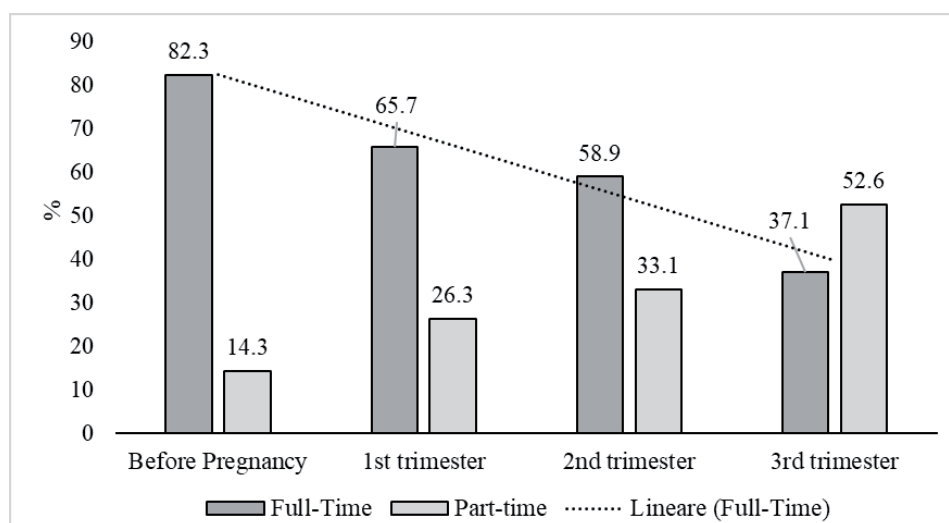


Fig. 1. Percentage of women working full-time or part-time with the progress of pregnancy.

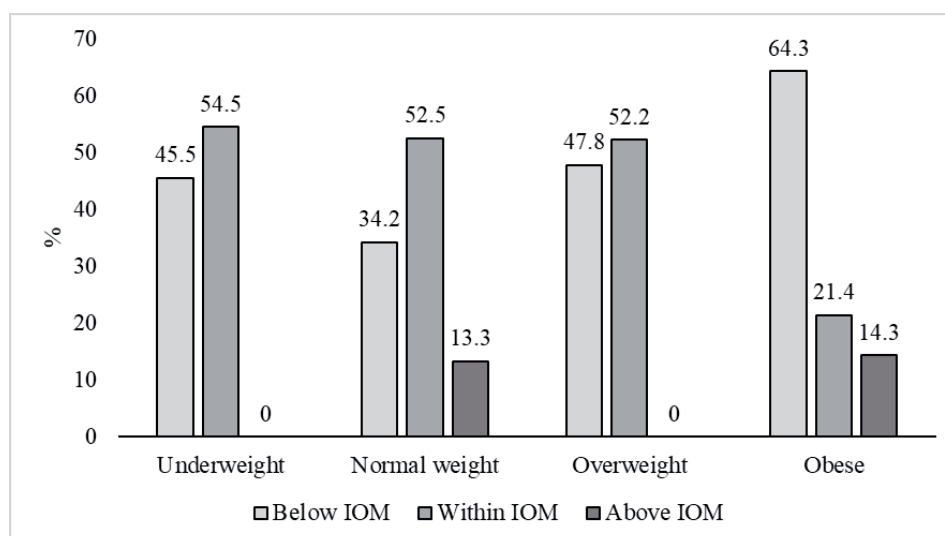


Fig. 2. Percentage of women who gained weight below, within, above the IOM recommendations and BMI classes.

ranges defined by the IOM guidelines for the gestational weight gain, while the 49.1% of women did not follow the IOM recommendations.

Furthermore, the overall gestational weight increase was divided into three categories: under the IOM limits, within the IOM limits and beyond the IOM limits. These three groups were then compared with the four BMI classes: Underweight: 45.5% has gained less than the recommendations, 54.5% is within the limits; Normal-weight: 34.2% has gained less than the recommendations, 13.3% more, while 52.5% remains within the limits; Overweight: 47.8% has increased less than the recommendations, 52.2% within the limits;

Obese: 64.3% is increased less than the recommendations, 14.3% above, 21.4% within limits. (Fig. 2)

As far as the eating habits before and during pregnancy, the 95% of recruited women affirmed to follow healthy eating habits already before pregnancy, this percentage raises to 99% in regard of healthy eating habits during pregnancy.

Lower back pain and pelvic pain were experienced in more than half of the sample in fact 105 women suffered from back pain during pregnancy. Urinary incontinence resulted increased by more than twice.

While investigating the physical activities carried out by women during the day and throughout the entire pregnancy, it was asked to the women to estimate the hours of walking within a typical day, with and without counting the hours of work (i.e. going and coming back from work, bringing the children to school, going to the supermarket, etc.). In 58% (101 out of 175) of the cases, the sum of walking hours in a day, excluding working hours, is less than 30 minutes (options from the questionnaire: less than 5 minutes, 5-15 minutes, 15-30 minutes). The 37% (64 out of 175), on the other hand, affirmed to walk more than 30 minutes. The percentage of missing answers is 6% (10 out of 175).

The household activities considered are medium-hard ones, so for example washing floors or shopping. The trend of carrying out domestic activities before pregnancy and in the first, second and third trimesters is inversely proportional to the advance of gestational age. Before pregnancy

the women than practiced domestic activities once a week, every day, several times a day are 147 (85%), in the first trimester 124 (71%), in the second one 119 (68%) and in the third 108 (62%). Respectively, they increase from 19 (11%) before pregnancy to 55 (31%) in the third trimester. Missing answers are less than 7% in each period represented.

Women resulted less active in the first trimester. In fact, before pregnancy, 44.6% of pregnant women are active, while in the first trimester of pregnancy, 29.1% (51 out of 175) are active; surprisingly, in the second trimester 30.3% is physically active (53 out of 175) and in the last trimester, the 31.4% are physically active (55 out of 175).

Aerobic physical activities, such as: walking, jogging or running, swimming, cycling, strength or weight training, cross-country skiing or ice skating, roller skating, martial arts and aerobic training, resulted the most practiced both before and during pregnancy.

Moreover, the frequency of the exercise was investigated presenting different options: once a week, 2-3 times a week, 4-5 times a week, every day, several times a day. For statistical purposes, these options have been grouped into two categories: less than 3 times a week and more than 3 times a week, based on the ACOG recommendations (ACOG, 2015). The majority of women exercised less than 3 times a week. On the other hand, women exercising more than 3 times a week gradually decrease with the progress of pregnancy. The duration of exercise was defined as: less than 1 hour and more than 1 hour per day. Most of the women answered that they practiced exercise less than 1 hour per day. The number of women exercising more 1 hour/day progressively decreases from the pre-pregnancy period to the first trimester, and then it remains unchanged for the rest of pregnancy.

Furthermore, we investigated the tendency of health professionals, such as midwives and obstetricians, to make recommendations regarding practicing sports and physical activities during pregnancy. Only half of the women (87 out of 150) received indications regarding this topic. The 62% (108 out of 175) said they have received one or more of the



following advices concerning the performance of aerobic physical activity: walking, swimming, breathing exercises, yoga, cycling on good and flat cycle paths, perform gymnastics, aerobics or courses for pregnant women. Instead, 11% (20 out of 175) say they have received general indications: no efforts, keep physically active, continue the type of activity practiced before pregnancy, perform activities only after receiving the certificate of good health or not to overload the abdomen.

Lastly, we investigated the leisure activities the hours spent in front of the TV, reading and the hours of sleep.

The hours spent in front of the TV were analyzed as: less than 2 hours and more than 2 hours. The total number of responses received is 164 and 145 respectively. About 70% of women watch TV for 2 hours per day, both during the week and on weekends. The missing answers are 27% (47 out of 175). Moreover, 156 women spent less than 2 hours reading and 148 read more than 2 hours per day.

Regarding the hours of sleep on weekdays and holidays. The majority of pregnant women declared to sleep less than 8 hours both during the week and on weekends or holidays. The percentage of missing answers is 4.6% for the category every day, and 16.6% for the weekend / holiday category.

To identify the factors that can influence weight gain, physical activity during pregnancy and a sedentary lifestyle we performed a logistic regression.

The logistic regression of weight gain according to 5 independent variables (i.e. low schooling, BMI < 25 kg/m<sup>2</sup>, physical activity carried out in the third trimester of gestation, hours spent watching TV in weekdays and employment / unemployment), revealed that low schooling can slightly influence weight gain in a negative way, even if it is not possible to define it as an effective risk factor for the significance index obtained ( $p=0.065$ ).

Physical activity during pregnancy resulted negatively influenced by pelvic pain (OR 0.34, CI 0.12-0.97,  $p=0.043$ ) and positively influenced by regular activity performed before pregnancy (OR 3.43, CI 1.408-8.358,  $p=0.007$ ) (Table 1).

Sedentariness resulted significantly influenced by having a pre-pregnancy BMI greater than 25 kg/m<sup>2</sup> (OR 2.998, CI 1.095-8.208,  $p=0.03$ ) (Table 2).

*Table 2. Association between Sedentariness and BMI > 25, Education level, Working activities, Low-back pain, Pelvic pain, Professional recommendations*

Sedentariness	OR	95% CI		P value
BMI > 25	<b>2.998</b>	1.095	8.208	<b>0.033</b>
Education level	0.836	0.315	2.218	0.719
Working activities	1.11	0.254	4.845	0.889
Low-back pain	1.045	0.428	2.548	0.923
Pelvic pain	0.732	0.275	1.95	0.533
Professional	0.971	0.386	2.443	0.95

## Discussion

Women enrolled in our study resulted to be on average 33 years old and reported to have a medium-high education level. They completed the questionnaire at around 36 weeks of gestational age. Their working activities resulted in 70% of the cases to be of sedentary type, in fact, not many cases reported that their work required to lift heavy loads more than 20 times a week. Probably linked to this concept, the percentage of women working full-time remains above 50% for more than half of pregnant women until the second trimester, and then falls to 37% only after 28 weeks of gestational age.

The excessive weight gain resulted to be related with low education, high pre-gestational BMI, physical activity during pregnancy, level of sedentariness and employment.

The number of women practicing physical activity decreases with the progress of pregnancy and this trend is also confirmed by the study of Haakstad, et al. (2007) and Nascimento, et al. (2015).

Medium-heavy domestic activities resulted carried out several times a week by most of the women before pregnancy, this percentage decreases of 30% in the third trimester.

Women who trained more than three times a week before pregnancy reduced the number of days a week to less than three with the progress of pregnancy.

*Table 1. Physical activity in pregnancy and its association with: Physical activity before pregnancy, low-back pain, professional recommendations, BMI, urinary incontinence, working activities, education level, pelvic pain, other children.*

Physical activity in pregnancy	OR	95% CI		P value
Physical activity before pregnancy	3.431	1.408	8.358	0.007
Pelvic pain	0.34	0.12	0.967	0.043
Professional recommendations	2.316	0.92	5.831	0.075
BMI	1.927	0.894	4.15	0.094
Urinary incontinence	1.806	0.628	5.196	0.273
Working activities	2.67	0.436	16.358	0.288
Education level	1.385	0.506	3.788	0.526
Pelvic pain	1.071	0.437	2.622	0.881
Other children	0.99	0.375	2.617	0.984

From these data, therefore, it emerges that physical activity tends to drop from the first trimester of gestation. Women not practicing regular physical activity before pregnancy, did not change their sedentary lifestyle during pregnancy. On the contrary, if regular exercise was already practiced before pregnancy, it resulted more likely to be continued also during pregnancy. The most common type of physical activity is aerobic, both before and during pregnancy such as walking, swimming reported by several studies (Haakstad, 2007; Runge 2013).

Among the pregnant women with a sedentary lifestyle, the lack of time and the difficulty in combining physical exercise with work and / or study resulted to be the causes of their inactivity. Interestingly, the most statistically significant risk factor for sedentariness is the body mass index over 25 kg/m<sup>2</sup>. Therefore, overweight or obese women are more likely to remain sedentary during pregnancy.

As far as the recommendations received from health professionals concerning physical activity during pregnancy (mostly indicating the performance of aerobic physical activity), half of the women stated that they were sufficiently exhaustive, while in some cases they resulted poor and not exhaustive.

Physical activity is worldwide recognized as a tool for improving health and is an important instrument for weight control/reduction if compared to diet alone (Pancallo et al, 2015).

One of the most effective physical activity program has been reported to be the “Curves” program: a training followed by specialized personnel, that enhances individuality. A recent study by Cilindro et al, 2019 highlighted its effectiveness in women and defined it as the most suitable and effective. Therefore, this program could be considered as a strategy to encourage and promote physical activity, although there are no data yet on its use in pregnancy.

## Conclusions

In conclusion our study describes a sample of low-risk pregnancies characterized by a reduced number of women practicing regular physical activity. In fact, significant is the condition of sedentariness found in our population, for which it is right to undertake interventions aimed at informing pregnant women of various benefits that physical activity can bring. Midwives, especially those who work in the territory, who follow women since the first weeks of gestation, should inform them about the benefits of physical activities during pregnancy as indicated by national, international recommendations and from the different studies. In particular, because of the significant association, found in our study, between sedentariness and BMI greater than 25 kg/m<sup>2</sup>, it results important to direct these recommendations specially to overweight/obese pregnant women, addressing them to a healthy lifestyle that certainly includes also the performance of physical activity.

**Conflict of interest:** The authors report no conflicts of interest

**Ethical Approval:** The study was approved by the local Ethical Committee

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