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CLINICAL ARTICLE

Factors associated with changes in leisure time physical activity during early pregnancy

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ABSTRACT

Objective: To identify key factors involved in modifying leisure time physical activity (LTPA) during early pregnancy. *Methods:* A prospective study was conducted of 1175 pregnant women who attended a scheduled visit at Virgen de las Nieves University Hospital, Granada, Spain, at 20–22 weeks of pregnancy. The Paffenbarger Physical Activity Questionnaire was used to collect data regarding participation in any LTPA or physical activity performed according to society recommendations during early pregnancy and in the year before pregnancy. A polytomous regression model was used to identify factors associated with LTPA. *Results:* Approximately 20.0% of the women did not engage in any LTPA, and 68.0% did not achieve the recommendations for exercise, either before or during pregnancy. Desirable changes related to performing any LTPA or the society recommendations for LTPA during pregnancy were associated with university level of education (aOR, 3.64 [95% CI, 1.54–8.56] and aOR, 1.75 [95% CI, 0.67–4.57], respectively) and smoking cessation at pregnancy (aOR, 2.05 [95% CI, 0.97–4.35] and aOR, 4.83 [95% CI, 1.31–17.83], respectively). *Conclusion:* Few women achieved the minimum recommendations for exercise before or during pregnancy. Nevertheless, adoption of healthy lifestyle choices during pregnancy seemed to promote other healthy habits, such as participation in LTPA.

1. Introduction

General agreement exists when recommending physical activity during pregnancy [1–3]. The American College of Obstetricians and Gynecologists (ACOG) and the Royal College of Obstetricians and Gynaecologists (RCOG) recommend that healthy pregnant women should undertake moderate physical activity for at least 30 minutes every day (or nearly every day) [1,2]. Numerous studies have demonstrated that walking is the most popular type of leisure time physical activity (LTPA) that pregnant women perform [4–6].

Participating in physical activity on a regular basis is fundamental for health and decreases the risk of various conditions, including hypertension, type 2 diabetes mellitus, obesity, and diseases related to the cardiovascular system [7]. Among pregnant women, the benefits of exercise include reduced risk of gestational diabetes mellitus, reduced weight gain, reduced difficulties during labor, and improved emotional well-being [8,9]. In addition, performing exercises during pregnancy has advantages for the fetus and the newborn [10–12].

Despite the potential benefits of undertaking physical activity during pregnancy, some studies have reported a low prevalence of compliance with the recommendations. For example, a prevalence of approximately 20% has been recorded in the USA, Spain, and Ireland [4,5,13], while the prevalence in Portugal is 16% [14]. Furthermore, some studies have suggested that a decrease in the duration and intensity of LTPA may occur during pregnancy in relation to the previous non-pregnant year [15]. It would, therefore, be helpful to identify the main factors associated with decreasing LTPA in order to develop appropriate intervention strategies. Nevertheless, few studies have explored the factors potentially associated with undesirable changes in physical activity during pregnancy, and the results are not consistent, possibly owing to the methodology used to assess the level of physical activity, the time of measurement, or characteristics of the sample population [16].

The aim of the present study was to determine the key factors associated with decreasing or increasing LTPA during early pregnancy versus the year before pregnancy.

2. Materials and methods

A prospective study of 1175 healthy pregnant women was conducted. The eligible population comprised all Spanish women attending a scheduled visit between 20 and 22 weeks of pregnancy at the Virgen de las Nieves University Hospital, Granada, Spain, between June 1, 2004, and October 31, 2007. Approval was obtained from the Virgen de las Nieves University Hospital Ethics Committee

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and the University of Granada Ethics Committee. All eligible women signed a form of agreement before participation [5].

Inclusion criteria were coverage by the Andalusian Programme of Infant–Maternal Health (a free universal healthcare program for all pregnant women living in Andalusia that includes a scheduled visit at 20–22 weeks of pregnancy, during which abdominal ultrasonography is performed); singleton pregnancy; no pregnancy-related complications requiring bed rest; and residence in the catchment area of the study center. The Virgen de las Nieves University Hospital serves as reference facility for the north of Granada; this region includes approximately 400 000 inhabitants, with approximately 4000 births each year [17].

Study data were collected through a structured face-to-face survey, taken just before the ultrasound examination and performed by 2 interviewers who had already been trained in this issue. Along with sociodemographic, obstetric, and lifestyle variables, information about LTPA in the year before pregnancy and during the first 20–22 weeks of the current pregnancy was obtained using the Paffenbarger Physical Activity Questionnaire [18]. Information recorded with this questionnaire included type of LTPA, frequency (number of days per week), and duration (minutes per session). Each type of LTPA was assigned a pre-specified metabolic equivalent of task (MET), a measure of energy expenditure in calories per hour, according to the updated *Compendium of Physical Activities* [19]. Individual MET scores were calculated as follows: MET minutes/week = (MET–level) x (minutes/day) x (days/week). The accuracy and validity of the questionnaire were analyzed in a previous study of 50 pregnant women not included in the present study [20]. The accuracy of the questionnaire was excellent, with a pooled Spearman r correlation coefficient (rs) of 0.90. A Caltrac accelerometer was used to validate the present study. The correlation between the questionnaire and the accelerometer was similar to the correlation reported previously [21].

A systematic sample of 1222 women was initially recruited, equivalent to 1 in 5 of the eligible population. Nineteen women (1.6%) did not complete the interview, 15 women (1.2%) had incomplete data, and 13 women (1.1%) chose not to participate in the present study. The final sample size was therefore 1175 (96.1% of the initial sample). This sample size was originally designed to meet the requirements of a population-based case–control study, serving as the population control group. However, the distribution according to LTPA performance before and during pregnancy provided a power of 93% to detect an odds ratio (OR) equal to or higher than 2, enabling measurement of the strength of associations between unfavorable changes in LTPA and any related factors with a prevalence of 20% in the control group (i.e. women who did not perform any LTPA before or during pregnancy) and an α value of 0.05.

The women were classified into 4 groups defined by the variable "ANY-LTPA:" 1-1 (some form of LTPA performed both before and during pregnancy); 0-1 (LTPA performed during pregnancy only); 1-0 (LTPA performed before pregnancy only); and 0-0 (no LTPA performed either before or during pregnancy). Furthermore, considering all recorded information about LTPA type, frequency, and duration, a second dichotomous variable ("RECOMMENDED-LTPA") was created. This variable was defined as either meeting or not meeting the Centers for Disease Control and Prevention and the American College of Sports Medicine (CDC/ACSM) guidelines on physical activity and public health. The Committee on Exercise and Cardiac Rehabilitation of the American Heart Association supported these guidelines, which recommend moderate-to-vigorous LTPA requiring a minimum of 450 MET minutes/week [22]. These guidelines are equivalent to the ACOG and RCOG recommendations for pregnant women [1,2]. Women were classified into 4 groups according to RECOMMENDED-LTPA: 1-1 (women above the recommended limit both before and during pregnancy); 0-1 (women above the limit only during pregnancy); 1-0 (women above the limit only before pregnancy); and 0-0 (women below the limit both before and during pregnancy).

Data were analyzed using Stata version 11.0 (StataCorp, College Station, TX, USA). Polytomous regression models were constructed to evaluate the relationship between a set of independent variables and the status of participants according to ANY-LTPA and RECOMMENDED-LTPA. In both models, the reference category for the dependent variable was 0-0. Independent variables included age, body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters), educational level, smoking status, parity, previous spontaneous abortion, energy intake, and MET of LTPA before pregnancy. A similarity ratio test was used to examine the existence of interactions between pairs of independent variables. A P value below 0.05 was considered statistically significant.

3. Results

Supplementary Material S1 shows the main sociodemographic features of the study group. At interview, the mean maternal age was 29.8 ± 5.14 years and the mean gestational age was 21 ± 3.7 weeks. Prior to pregnancy, 36.5% of the women smoked; however, approximately 50.0% ceased smoking during the early months of pregnancy.

Most women (68.6%) performed some LTPA before and during pregnancy (category 1-1), whereas 19.4% did not perform any LTPA before or during pregnancy (category 0-0). The frequency of women who showed undesirable changes—from some LTPA before pregnancy to no LTPA during pregnancy—was 4.7% (category 1-0). Conversely, 7.3% of the women showed a positive change in LTPA during pregnancy (category 0-1).

The polytomous regression analysis for the ANY-LTPA variable is shown in Table 1. Category 0-0 was used as the reference population. Category 1-1 was positively associated university level of education; the adjusted OR (aOR) was 1.31 (95% confidence interval [CI], 1.22–3.73). Cessation of tobacco smoking before or during pregnancy was also associated with category 1-1; the aOR was 2.06 (95% CI, 1.19–3.58) before pregnancy and 2.14 (95% CI, 1.22–3.73) during pregnancy. The frequency of undesirable changes (category 1-0) was directly related to social class II (aOR, 3.72 [95% CI, 1.00–13.90]) and inversely related to a monthly family income below €3000 (aOR, 0.10 [95% CI, 0.02–0.47]) and previous deliveries (aOR, 0.37 [95% CI, 0.17–0.80]). Finally, positive changes (category 0-1) were associated with university education (aOR, 3.64 [95% CI, 1.54–8.56]) and tobacco cessation at the onset of pregnancy (aOR, 2.05 [95% CI, 0.97–4.35]).

The polytomous regression analysis for the RECOMMENDED-LTPA variable is shown in Table 2. Only 14.9% of the women complied with recommendations before and during pregnancy; most of the women (68.0%) were in group 0-0 (i.e. not achieving minimum recommendations regarding LTPA either before or during pregnancy). In the adjusted model, factors positively associated with group 1-1 were non-smoking (aOR, 2.00 [95% CI, 1.00–3.98]) and age 30–35 years (aOR, 2.55 [95% CI, 1.07–6.06]). An inverse correlation was found for previous deliveries (aOR, 0.55 [95% CI, 0.33–0.92]).

No variable was clearly associated with undesirable changes in LTPA (category 1-0). However, positive changes (group 0-1) were directly related to tobacco cessation before (aOR, 5.66 [95% CI, 1.57–20.30]) or during (aOR, 4.83 [95% CI, 1.31–17.83]) pregnancy and to university education (aOR, 1.75 [95% CI, 0.67–4.57]), but inversely related to low monthly family incomes (aOR, 0.33 [95% CI, 0.12–0.90]). All interactions tested in both models were non-significant.

4. Discussion

Although the practice of some form of LTPA was frequent before and during pregnancy, the findings of the present study suggest that few women met the recommendations proposed by CDC/ACSM and the American Heart Association (before pregnancy) or ACOG and RCOG (during pregnancy)—just 27.5% before pregnancy and 19.4%