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Physical activity in pregnant women of low socioeconomic level Barranquilla, Colombia in 2023

Actividad física en gestantes de bajo nivel socioeconómico Barranquilla, Colombia en el 2023

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ABSTRACT

Introduction: In pregnant women, low levels of physical activity constitute a risk factor for health. Socioeconomic level is a factor that may contribute to the increase in the negative impact of inactive lifestyles during pregnancy. **Objective:** To identify the level of physical activity of pregnant women of low socioeconomic status and determine the association of different gestational periods with biological, anthropometric factors and active behaviors. **Method:** An analytical cross-sectional study was carried out on 473 pregnant women from lower strata between May and June 2023. Sociodemographic characteristics, level of physical activity, stages of change in active behaviors and anthropometric assessment were determined. A descriptive analysis was proposed and Chi^2 tests were performed to determine the association between the analyzed variables and the ANOVA test to compare means. **Results:** 71.2% of the women were physically inactive and 80.1% did not walk the minimum number of minutes per week. 44.1% had planned to do physical activity during pregnancy. In the first and second trimester, more inactive women were found compared to the third trimester (p-value <0.05). **Conclusions:** The majority of pregnant women documented in this article did not meet the minimum recommendations for weekly physical activity.

Palabras clave:
embarazo; actividad física; trimestres del embarazo; complicaciones del embarazo; clase social.

RESUMEN

Introducción: en la mujer gestante, el bajo nivel de actividad física constituye un factor de riesgo para la salud. El nivel socioeconómico es un factor que puede contribuir al aumento del impacto negativo de los estilos de vida inactivos durante la gestación. **Objetivo:** identificar el nivel de actividad física de mujeres gestantes de bajo nivel socioeconómico y determinar la asociación de los diferentes periodos gestacionales con factores biológicos, antropométricos y conductas activas. **Método:** se realizó un estudio transversal analítico en 473 gestantes de estratos bajos entre mayo y junio del 2023. Se determinaron las características sociodemográficas, nivel de actividad física, etapas de cambio frente a conductas activas y valoración antropométrica. Se planteó un análisis descriptivo y se realizaron pruebas de Chi^2 para determinar la

asociación entre las variables analizadas y la prueba ANOVA para comparar medias. **Resultados:** El 71,2% de las mujeres eran físicamente inactivas y el 80,1% no caminaban el mínimo de minutos a la semana. El 44,1% tenían contemplado realizar actividad física durante el embarazo. En el primer y segundo trimestre se encontraron más mujeres inactivas frente al tercer trimestre (p-valor<0,05). **Conclusiones:** la mayoría de las gestantes documentadas en el presente articulo no cumplían con las recomendaciones mínimas de actividad física semanal.

INTRODUCTION

Physical activity (PA) benefits are widely demonstrated in all populations. Nevertheless, estimations from the World Health Organization (WHO) indicate that 60% of the world's population needs to do the minimum amount of PA weekly[1,] including at least a quarter of adults and four-fifths of adolescents[2.] This generates a 30% increase in the risk of dying from non-communicable diseases compared to physically active subjects[1.]

Physical inactivity (FI) is a phenomenon that is also reflected in pregnant women. International reports estimate that at least 55% of these do not comply with the minimum PA recommendations[3,] being a factor associated with the increased risk of multiple pregnancy complications such as excessive weight gain, gestational diabetes mellitus (GDM), and preeclampsia[4,5.] The problem seems more complex at the local level, according to a report from 20176, led by Pinillos-Patiño *et al*[6]. They showed a high prevalence of FI of 69.1% in a sample of 579 pregnant women from Barranquilla, worsening the figures in the diagnosed with GDM, where the prevalence of FI was around 83.2%.

The WHO recommends that pregnant women perform 150 minutes of moderate-intensity aerobic PA, which would guarantee essential benefits for the health of the woman and the unborn child[1]. However, some reports have specified that prescription aerobic physical exercise and muscle strengthening with a minimum frequency of twice a week is sufficient to control glucose levels during pregnancy[7]. However, physiological and biomechanical changes during the gestational period seem to influence active behaviors negatively; Di Fabio *et al*[8] stated that, compared to the second trimester of pregnancy, women increased the total time linked to sedentary behaviors during the third-trimester.

The role played by socioeconomic level contributes to the increase in the magnitude of the impact of risk factors associated with obesity and other chronic diseases during pregnancy. Of the main obstacles because 60% of pregnant women do not follow prenatal PA recommendations, poverty and lack of knowledge stand out[9.] In this way, limiting factors that may influence the position of pregnant women regarding adopting PA as a strategy linked to the promotion of good physical health and prevention of complications would be considered.

Due to the problem that the lack of PA during pregnancy represents for the health of the woman and the fetus, analyses are required that reflect the reality of socioeconomically vulnerable populations. The present study aims to identify the level of PA in pregnant women of low socioeconomic status and determine the association of different gestational periods with biological and anthropometric factors and active behaviors.

METHOD

Investigation design

A descriptive cross-sectional observational study was carried out, constituting an observation procedure without follow-up in a community or representative sample studied at a specific moment to describe a specific phenomenon.

Participants

The population comprised pregnant women who attended awareness-raising and screening sessions of the program promoting healthy lifestyles in the pregnant population developed through the Vida Nueva Foundation of the district of Barranquilla, Colombia. Within the sample, women who corresponded to 3% (n=15,609) of the total pregnant women censused by the New Life Generation program for 2023 were selected under opportunity sampling. Those women who met the following criteria were included. Inclusion criteria were without medical restriction for the practice of PA,

residents of the city's southern, southwestern, and southeastern neighborhoods, and low-income strata were at least in the fourth week of gestation. Women with disabilities were excluded. Finally, a total of 473 pregnant women distributed in all trimesters of pregnancy (1st trimester 14.4%, second trimester 48.6%, and third trimester 37%) from low socioeconomic stratum (86.3% low-low-income, and 13.7% high-low-income) were included in the study. The information was collected during the May and June 2023 nutritional screening campaigns.

Instruments

A self-developed survey was applied that characterized the sociodemographic aspects of the subjects, as well as their health history and pregnancy complications. The survey was developed considering the national guidelines described in Resolution 2465 of 2016. Additionally, aspects related to physical condition and nutritional status were assessed in the same survey. For its application, a professional assessed and classified nutritional status according to gestational age[10]. To calculate body mass index (BMI), body weight was assessed with an electronic scale (OMRON HN-289, Tokyo, Japan), and standing height was measured with a portable stadiometer (Seca 217, Seca Hamburg, Germany).

To measure physical activity levels, the International PA Questionnaire (IPAQ) was used, in its short version, which has an average validity of 0.5 and an average reliability of 0.5 according to what was documented by Mantilla-Toloza *et al*[11]. The results of the questionnaire allowed the population to be stratified into two categories: inactive (<1500 METs /week) and active (>1500 METs /week), depending on the intensity, time, and weekly frequency of the activities carried out. Energy expenditure values in METs were calculated according to the guidelines for questionnaire data processing.

Finally, to determine the intention regarding a physically active behavior, the Stages of Change Questionnaire was applied, a tool that is based on Prochaska's transtheoretical model and that tries to describe how people change their disposition or behavior regarding a behavior, problem, or specific situation, which may involve an intentional change about that situation. Leyton *et al*[12] reported internal consistency values above 0.70. Therefore, there is a positive and significant prediction of the most active stages of the transtheoretical model on the intention to be physically active. Applying the questionnaire allowed the pregnant woman to be categorized into six stages of change: pre-contemplation, contemplation, preparation, action, maintenance, and relapse.

Procedures

The data were stored in an Excel database. Data processing and information analysis were done using the SPSS version 24.0 statistical package. Categorical variables were analyzed using absolute frequencies and percentages. Some quantitative measurements are presented in means and standard deviations. The normality of the quantitative data was determined using the Kolmogorov-Smirnov normality test. Subsequently, a descriptive analysis was conducted, with frequency distribution measurements according to the variables studied. Pearson's chi-squared tests were used to determine the degree of independence between the variables for each of the trimesters of pregnancy. The means of the quantitative variables were compared using the ANOVA test for the situations presented. A p-value less than 0.05 was considered statistically significant for all tests.

Statement on ethical aspects

The present study is considered a risk-free investigation by Colombian legislation, Resolution 008430 of October 4, 1993, and its article 11. Likewise, the present study adheres to the ethical principles for studies of human beings set forth by the Declaration of Helsinki. This study was carried out with the informed consent signed by the pregnant women who were part of the research project "Physiotherapy, Health, and Movement," approved by the Scientific and Ethics Committee of the University that led the research. The authors declare that they have no conflicts of interest.

RESULTS

The average age was 24.4±5.8 years, considering that the age range for this parameter was 14 to 44 years, within which women between 18 and 25 years represented the most significant proportion of the population. (51.4%). According to Table 1, most women were in the second trimester of pregnancy

48.6%, with 23.7±8.7 weeks being the average of the total population studied. The educational level data showed that 53.48% of women finished high school, and 80.9% reported not doing any economic activity.

Fifty percent showed alterations in nutritional status related to overweight or obesity, while 19.4% presented weight below what was recommended for the weeks of gestation. 13.1% of the participating women reported having some complications. It can also be seen that 71.2% of women do not perform the minimum PA according to the IPAQ classification. Regarding the stages of change regarding the performance of PA, 20% do not consider including this behavior during the gestation period, while only 3.5% state that they have been performing PA for at least six months—more information in Table 2.

When analyzing the comparisons of means grouped according to the trimester of gestation versus the amount of time spent walking per week, age, and nutritional status, it is evident that the average BMI of the women in the first trimester of gestation was significantly lower than those observed in the second and third trimester (p-value<0.05). The quantification of the time spent in a typical week for walking showed no statistical differences, as well as the energy expended for weekly PA (p-value >0.05). See Table 3.

Table 1. Sociodemographic characteristics of the women under study.

Characteristic		**n**	**%**
Age	<18	49	10.3
	18-21	112	23.7
	22-25	131	27.6
	26-29	91	19.2
	30-33	55	11.6
	34-37	21	4.4
	>37	14	2.9
Pregnancy trimester	First	68	14.3
	Second	230	48.6
	Third	175	37.0
Income	Low-low	408	86.2
	High-low	65	13.7
Civil status	Single woman	110	23.2
	Free Union	311	65.7
	Married	48	10.1
	Divorcee	2	0.4
	Widow	2	0.4
Education level	None	2	0.4
	incomplete primary	12	2.5
	Primary	34	7.1
	incomplete secondary	54	11.4
	Secondary	253	53.4
	Technical/Technological	87	18.3
	Academic	31	6.5
Occupation	Unemployed	383	80.9
	Employee	45	9.5
	Independent	45	9.5

Finally, within the results obtained, the frequency distribution of the nutritional status categories can be seen according to the trimester of gestation, showing that more than 50% of the women in the second and third trimesters were overweight or obese, in addition to 26.2% of women in the third trimester were underweight according to the values suggested for the weeks of gestation (p-value <0.05). Regarding compliance with 150 minutes of weekly walking, it was observed that the proportion of women who did

not comply was similar in the three trimesters. At the same time, women in the third trimester of pregnancy were proportionally less inactive (p-value <0.05). Finally, 50% of women in the first trimester planned to start PA during the rest of the pregnancy (Table 4).

Table 2. Nutritional status, health situation, PA level, and stages of change regarding PA of the studied population (n=473).

Characteristic		n	%
Nutritional condition	Underweight	92	19.4
	Normal weight	142	30
	Overweight	129	27.2
	Obesity	110	23.2
Complications	Preeclampsia	22	4.6
	DMG	17	3.5
	Others	23	4.8
Physical activity level	Inactive	337	71.2
	Active	136	28.7
Stages of change versus AF	Precontemplation	95	20
	Contemplation	209	44.1
	Preparation	84	17.7
	Action	27	5.7
	Maintenance	17	3.5
	Relapse	41	8.6

GDM: gestational diabetes mellitus. PA: physical activity

Table 3. Comparison of means of biological characteristics and amount of PA in a typical week of women grouped according to the trimester of gestation (N=473).

Characteristic	First Quarter (n=68)		Second Quarter (n=230)		Third Quarter (n=175)		Anova p-value
	M	SD	M	SD	M	SD	
Age (years)	23.7	6.1	24.6	6.1	24.2	5.4	0.50
BMI (k/m^2)	26.07	6.1	27.8	5.40	28.4	5.6	0.01
Time in weekly walks (min)	118.6	44.7	115.1	44.5	111.4	47.8	0.90
Weekly energy in AF (METs)	1235.5	554.9	1191.3	339.2	1249.0	496.5	0.10

BMI: body mass index. This means they are statistically different and do not share the same superscript letter. M: mean. SD: standard deviation.

DISCUSSION

The study's main finding shows that almost three-quarters of the women analyzed do not expend enough energy weekly to be considered physically active, which generates a negative contribution to the recording of PA levels in the pregnant population, as Pinillos-Patiño *et al*[6] documented. Although these authors did not consider gestational age as a factor associated with the amount of time spent performing PA, they did state that the perception of lack of free time, fear of injury, and the absence of resources are linked elements to FI in almost all the participating women.

Another relevant result of the present study showed that regardless of the trimester of gestation, the number of inactive pregnant women exceeded two-thirds. These deductions were similar to those reported by Gamble *et al*[13], who analyzed the PA levels of socioeconomically disadvantaged German pregnant adolescents, showing that during the entire gestational period at least two-thirds of the women were physically inactive. Previously, in 2019, do Nascimento *et al*[14] had already shown a similar prevalence in pregnant women of low

socioeconomic status in Brazil, also showing that those with inactive behaviors at the beginning of pregnancy had a higher risk of developing GDM.

Table 4. Frequency analysis was performed according to the categories of nutritional status, PA level, and stages of change in PA of the women grouped according to the trimester of gestation (N=473).

Characteristic		First Quarter (n=68)			Second Quarter (n=230)			Third Quarter (n=175)			Chi-squared p-value
		n	%	% total	n	%	% total	n	%	% total	
Nutritional condition	Underweight	10	14.7	2.1	36	15.6	7.6	46	26.2	9.7	
	Normal	25	36.7	5.2	77	33.4	16.2	40	22.8	8.4	
	Overweight	19	27.9	4.02	56	24.3	11.8	54	30.8	11.4	
	Obesity	14	20.5	2.9	61	26.5	12.9	35	20.0	7.4	
Hikes	More than 150' weekly	17	25	3.5	44	19.1	9.3	33	18.8	6.9	
	Less than 150' weekly	51	75	10.7	186	80.8	39.3	142	81.1	30.02	
AF level – IPAQ	Inactive	51	75	10.7	172	74.7	36.3	114	65.1	24.1	
	Active	17	25	3.5	58	25.2	12.2	61	34.8	12.9	
Stages of change	Precontemplation	13	19.1	2.7	52	22.6	10.9	30	17.1	6.3	10.5
	Contemplation	3 4	50.0	7.1	98	42.6	20.7	77	44.0	16.2	
	Preparation	9	13.2	1.9	44	19.1	9.3	31	17.7	6.5	
	Action	4	5.8	0.8	11	4.7	23	12	6.8	2.5	
	Maintenance	0	0	0.0	8	3.4	1.6	9	4.1	1.9	
	Relapse	8	11.7	1.6	17	7.3	3.5	16	9.1	3.3	

PA: physical activity; IPAQ: international physical activity questionnaire.

Excessive weight gain during pregnancy is a problem that impacts the health of the mother and fetus since pregnant women with obesity have a higher prevalence of hyperinsulinemia and dyslipidemia, deteriorating cardiovascular function with a higher risk of blood pressure, oxidative stress, and endothelial inflammation, in addition to being a factor associated with childhood overweight[15,16]. Along these lines, a recent meta-analysis that included 19 studies found that the high prevalence of overweight and obesity in pregnant women was associated with a higher risk of preeclampsia. The calculated OR for 13 studies (compared with overweight and average weight) was 1.7 (95%CI 1.5-1.9) for random effects models, and for 19 studies (compared with obesity and average weight) was 2.4 (95%CI 2.1-2.9)[17].

Relating this information to gestational diabetes, half of the women participating in this study showed a nutritional status above what was recommended. It is clear that due to the descriptive nature of the study, it cannot associated with this figure solely with the high prevalence of FI since excessive weight gain is a multicausal phenomenon; if we were able to show that women in the third trimester had the lowest proportion of IF compared to the first and second trimester according to the energy expended in weekly PA, which goes against the general trend[8,13,14]. This trend is also shown in the study by Sun *et al*[18], with a

sample of 747 Taiwanese women, where 60% of the pregnant women studied reduced their PA levels as the pregnancy progressed. Those who reduced their energy expenditure drastically (below 4000 METs-min/week) had a higher incidence of obesity.

Walking is a way to promote benefits to the physical health of the pregnant woman and the fetus. It is usually an accessible activity and widely recommended by health professionals, especially for those women with hyperglycemia or GDM, since walking has demonstrated beneficial effects on glucose metabolism. Recently, Andersen *et al*[19] stated that 20 minutes of walking four days a week reduces glucose levels in postprandial periods in women with GDM[19]. Likewise, Chen et *al*[20], in 197 women, showed that regular light PA such as walking was an appropriate strategy for pregnant women to regulate serum glucose levels and reduce the incidence of GDM. These findings reinforce the concern by observing that, in the population of women analyzed in the present study, the time spent walking as PA is minimal since the weekly average for the three trimesters is far from the 150 minutes recommended by the WHO as light to moderate PA. In proportion, only 19.8% of all women reported meeting this recommendation.

Finally, and as a no less important result, it is striking that one-tenth of the women studied were underage adolescents (<18 years). It has previously been reported that the high prevalence of pregnancy in adolescents reflects a problem with multidimensional significance within society. Pregnant adolescents do not have priority for healthy practices within their lifestyles, with PA being among them, because their condition affects personality, and this is relevant for the acquisition or not of preventive behaviors; however, these Healthy behaviors are also mediated by family and sociocultural aspects and, to a high degree, school dropout[21-23].

LIMITATIONS

This study presents several restrictions typical of cross-sectional studies, which reduce the possibility of demonstrating causality or multicausality. Some limitations include the non-inclusion of parameters unrelated to sociodemographic and anthropometric characteristics, the fact that the findings depend on self-reports, and the perceived barriers to PA were not investigated. However, the study denotes a diagnosis of plausible relevance in the current epidemiological context, especially considering the transition of the global COVID-19 pandemic to endemic status, motivating the development of future research with greater control of bias and encouraging more complex analyses.

CONCLUSIONS

It can be concluded that, regardless of gestational age, most of the women studied from low socioeconomic status did not comply with the minimum PA recommendations, including the sum of the energy expended in daily activities, in free time, and used for walking. Likewise, the prevalence of overweight, obesity, and teenage pregnancy is alarming.

DECLARATION OF CONFLICTS OF INTEREST

The authors of this research work declare that there is no conflict of interest with organizations, companies, or individuals; the objective of the work is purely academic and was financed by the institutions to which the researchers pay.

CONTRIBUTION OF THE AUTHORS

The **first author** participated in structuring the article and analyzing the results.
The **second author** completed the statistical analysis.
The **third author** made editing and data analysis.
The **fourth author** provided theoretical support for the research.
The **fifth author** collected information and made the analysis.
The **sixth author** did fieldwork for the application of questionnaires.
The **seventh author** participated in the information collection.

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