Rev Saúde Pública 2013;47(5):1-10

Public Health Practice
Original Articles

DOI:10.1590/S0034-8910.2013047004689

Maria Antonieta de Barros Leite Carvalhaes[I]

Ana Carolina de Almeida Martiniano[II]

Maíra Barreto Malta[III]

Monica Yuri Takito[IV]

Maria Helena D'Aquino Benício[V]

Physical activity in pregnant women receiving care in primary health care units

ABSTRACT

OBJECTIVE: To describe physical-activity patterns of low-risk pregnant women and investigate associated factors.

METHODS: This is a cross-sectional study based on a sample (n = 256) of adult pregnant women in their 2nd trimester. The participants were randomly selected among those attending primary health care units in Botucatu in Sao Paulo State in 2010. Physical activities were investigated by using the pregnancy physical activity questionnaire and by analyzing the time and intensity of the following activities: occupational, commuting, household and leisure, expressed in metabolic equivalents/day. The pregnant women were classified according to their level of physical activity and to achieving 150 minutes/week of leisure physical activities, which were the dependent variables in the study. The association between such variables and socioeconomic variables, maternal characteristics, behavioral factors and the care model in the health care unit was evaluated by Poisson regression models with robust variance and by adopting the hierarchical model.

RESULTS: Most pregnant women were insufficiently active (77.7%); 12.5% were moderately active and 9.8% were vigorously active. The highest daily energy expenditure was in carrying out household activities, followed by commuting activities. Only 10.2% of them followed the recommendation, successfully achieving 150 minutes of leisure physical activities per week. Having a job outside of the home reduced the chance of achieving such recommendation (OR = 0.39, 95%CI 0.16;0.93). Having at least one previous delivery (OR = 0.87, 95%CI 0.77;0.99) and being overweight pre-pregnancy (OR = 0.85, 95%CI 0.731;0.99) reduced the chance of being insufficiently active whereas consuming healthy foods less frequently slightly increased it: OR = 1.18, 95%CI 1.02;1.36.

CONCLUSIONS: Pregnant women who were cared for in primary health care units were insufficiently active. Having at least one previous delivery and being overweight pre-pregnancy were identified as protective factors against such condition. Less frequent intake of healthy foods was found to be a risk factor, therefore suggesting a cluster of health risk factors.

DESCRIPTORS: Pregnant Women. Motor Activity. Leisure Activities. Sedentary Lifestyle. Risk Factors. Cross-Sectional Studies.

[I] Departamento de Enfermagem. Faculdade de Medicina de Botucatu. Universidade Estadual Paulista. Botucatu, SP, Brasil

[II] Programa de Pós-Graduação em Ciências Nutricionais. Faculdade de Ciências Farmacêuticas de Araraquara. Universidade Estadual Paulista. Araraquara, SP, Brasil

[III] Programa de Pós-Graduação em Saúde Coletiva. Faculdade de Medicina de Botucatu. Universidade Estadual Paulista. Botucatu, SP, Brasil

[IV] Departamento de Pedagogia do Movimento do Corpo Humano. Escola de Educação Física e Esporte. Universidade de São Paulo. São Paulo, SP, Brasil

[V] Departamento de Nutrição. Faculdade de Saúde Pública. Universidade de São Paulo. São Paulo, SP, Brasil

Correspondence:
Maria Antonieta de Barros Leite Carvalhaes
Departamento de Enfermagem – Unesp
Distrito de Rubião Júnior, s/n
18618-670 Botucatu, SP, Brasil
E-mail: carvalha@fmb.unesp.br

Received: 12/13/2012
Approved: 4/25/2013
Article available from: www.scielo.br/rsp

INTRODUCTION

Previous recommendations on exercise during pregnancy consisted in advising a reduction from normal levels for those already doing exercise, and advising those who were not, not to start any new exercise regime.[1]

Recent literature shows the need to discriminate between types of physical activity (PA) when considering its effects on pregnancy. Occupational physical activities that involve a lot of effort have harmful effects on pregnancy outcomes,[23] and leisure and physical activities have positive effects.[20] Recent investigations have identified the protective effects of being physically active during pregnancy on prematurity,[13] gestational diabetes and pre-eclampsia,[20] the major health problems currently affecting mother-baby health in Brazil.[22]

Pre-gestational obesity and excessive weight gain during pregnancy have become important problems in Brazil over the last few decades,[6,14,19] increasing the relevance of studies on physical activity in women of childbearing age and pregnant women, Studies on patterns of physical activity in the country have focused on adults.[11] A high proportion of pregnant women do not do any leisure time physical activities and sedentarism is more common at this stage of a woman's life than in the general population. In the municipality of Pelotas, RS, Southern Brazil, 12.9% of the women carried out some kind of physical exercise during pregnancy and this proportion decreased between the first (10.4%) and third (6.5%) trimester.[5] In the municipality of Campina Grande, PB, Northeastern Brazil, the percentage of pregnant women who were sedentary in the first trimester was 85.2%, rising to all of them in the third trimester.[21]

Physical activity in pregnancy is a modifiable risk factor, strongly present in developed countries. Interventions capable of increasing the proportion of active pregnant women have been designed and tested with promising results.[18] Knowledge of the determinants of the level of physical activity and carrying out physical activities in leisure time during pregnancy is incomplete, which makes it difficult to design interventions.

This study aimed to analyze the patterns of physical activity of low-risk pregnant women and associated factors.

METHODS

This was a cross-sectional study with a randomly selected sample of pregnant women from public primary health care units in Botucatu, SP, Southeastern Brazil, a medium sized city with around 130,000 inhabitants and a predominantly urban population in 2009. The sample was estimated assuming a prevalence of sedentary/insufficiently active women of 50.0%, with a 90% confidence interval and accuracy of 5%, resulting in 253 pregnant women. The criteria for inclusion were: being aged ≥ 18, in the second trimester of pregnancy (14 to 28 weeks) and with no diseases such as diabetes or hypertension, heart disease or any adverse condition that requires rest or reduced physical activity; multiple pregnancy was the criterion for exclusion.

Trained interviewers visited the health care units on days when prenatal care was provided and randomly selected a maximum of five pregnant women/day among those who met the criteria for inclusion. When there were fewer than six pregnant women, all were invited to take part in the study. This procedure was followed until the desired sample for each unit was achieved. There were 303 pregnant women selected, and 256 effectively studied, with the difference due to refusals.

Normal physical activity (in the week preceding the interview) were measured using a questionnaire, the Pregnancy Physical Activity Questionnaire (PPAQ), developed and validated for the American population[3] and recently translated, adapted and used with success for the Brazilian population.[17]

The metabolic equivalent of task (MET) were calculated for each type of physical activity (transport, leisure, occupational and domestic activities) based on the type of physical effort needed, the duration and the weekly frequency of each activity. Total daily energy expenditure, used to classify the pregnant women by level of physical activity (sedentary, not very active, moderately active and vigorously active), was calculated according to FAO/WHO/UNU (2001) criteria. This calculation considers that the minimum expenditure of an individual is equal to their basal rate, in other words, a MET multiplied by 24hrs. The level of physical activity is understood to be the total energy expenditure expressed as a multiple of the daily basal metabolic rate, calculated by the ratio: total daily MET obtained/24 MET. This ratio enables the pregnant woman's level of physical activity to be categorized into: sedentary/not very active (≤ 1.69), moderately active (from 1.70 to 1.99) and vigorously active (> 2.00).

The pregnant women were reclassified (and the categories renamed) dichotomously to identify factors associated with the level of physical activity: insufficiently active (sedentary or not very active) and active (moderately or vigorously active). The weekly time spent doing leisure time physical activity was categorized depending on whether or not it exceeded 150 minutes per week (yes; no), duration recommended for pregnant

women by the American College of Obstetricians and Gynecologists (2003).[1]

The weekly frequency with which healthy (fruit, vegetables and legumes) and unhealthy (processed meat, soft drinks and fried food) food were consumed was evaluated and used to calculate scores for the frequency of consumption of these food groups following the procedures described in Fornés et al[8] (2002). Scores ranged between 0 and 3; the higher the score, the more frequent the consumption. Terciles were calculated for these scores and two dichotomous variables created: healthy score (1st + 2nd terciles = low consumption; 3rd tercile = higher consumption, more favorable situation); unhealthy score (1st tercile = lower consumption, more favorable situation; 2nd + 3rd terciles = high consumption).

The pregnant women were interviewed by two graduate students in nutrition, one of whom was a scientific scholarship holder, in a private room in the health care units. Supervision included careful revision of the questionnaires and checking that 5% of the interviews were carried out by telephone, repeating some of the questions on physical activity.

Data was codified and entered at the time of collection and a database constructed using the Excel 2007 program. After conferring, verifying the consistence and range of the data, with eventual correction of errors, the database was transcribed for the Stata program, version 9, for analysis.

Descriptive statistics were prepared for the continuous variables: daily energy expenditure on leisure time physical activities, occupational and home-based physical activities and commuting and total daily expenditure (in MET); weekly time spent doing leisure time physical activities; healthy and unhealthy food scores. The rates of prevalence of insufficiently active pregnant women and those who did and did not achieve the recommended 150 minutes/week of leisure time PA were estimated.

To identify the factors associated with the level of physical activity (insufficiently active/active) and meeting the recommendations for leisure time physical activity (yes; no), uni- and multi-variate Poisson regression analysis with robust variance was carried out, guided by a hierarchical model. The independent variables were: schooling, *per capita* household income and the mother's work (block 1, most distal, made up of socioeconomic factors); maternal age, number of pregnancies and pre-gestational nutritional state, assessed using Institute of Medicine (IOM)[10] criteria (block 2, obstetric factors); smoking and position in relation to the terciles of the health and unhealthy eating habits (block 3, behavioral factors); health care model – traditional unit or family health care unit (block 4, most proximal). To be included in the model (multivariate analyses) as potential confounding factors for more proximal factors, $p < 0.25$ was adopted; to identify association, $p < 0.05$, evaluated in the hierarchical level of each variable after adjusting for factors in the same block and preceding blocks selected as potential confounding factors.

The medians of the scores for the health and unhealthy eating scores according to level of physical activity (insufficiently active and active) were compared by the median test, adopting $p < 0.05$ was the level of significance.

This study was approved by the Research Ethics Committee of the *Faculdade de Medicina de Botucatu*, after obtaining authorization from the Botucatu Municipal Department of Health (protocol CEP-FMB/Unesp 3.117-2009). The participants signed a consent form.

RESULTS

The pregnant women in question were predominantly in their first pregnancy or with one previous pregnancy (71.9%) and had an intermediate level of schooling (a mean of 9.4 years of study; standard deviation – sd: 2.6 years). A high percentage were on a low income (83.2% on less than one minimum wage *per capita*) and fewer than half worked outside of the home. Pre-pregnancy excess weight was common and three time more frequent than being underweight, and the mean pre-gestational body mass index was 23.8 (sd: 4.8 kg/m^2). Smoking during pregnancy was reported by 12.5% of the pregnant women. Fewer than half received pre-natal care in Family Health Care Units (Table 1).

The majority did no physical activity at all in their leisure time, approximately 27.0% walked, the predominant activity. When the time spent on the activities and the intensity of leisure time physical activities were calculated, the mean weekly time was 34.0 minutes (sd: 67.5 min), the median was 90 min; 10.2% achieved the recommended 150 min/week of leisure time physical activities. The proportion of pregnant women classified as insufficiently active (sedentary or not very active), was 77.7% (Table 2).

The highest mean values for daily energy expenditure were related to domestic activities, followed by travel (Table 3).

The median scores for healthy and unhealthy eating scores were 2.19 and 0.71 respectively. Insufficiently active pregnant women had lower median healthy eating scores compared with those who were active ($p = 0.002$).

Table 1. Characteristics of low-risk pregnant women cared for in the primary health care network. Botucatu, SP, Southeastern Brazil, 2010.

Variable	n	%
Per capita household income (minimum wages)		
< 0.5	110	43.0
0.5 to 0.9	103	40.2
1.0 and +	43	16.8
Schooling (years completed)		
< 8	55	21.5
8 to 11	183	71.5
12 and +	18	7.0
Working outside of the home		
Yes	108	42.2
No	148	57.8
Age (years)		
18 to 34	232	90.6
35 and +	24	9.4
Previous births		
0	101	39.5
1	83	32.4
2 and +	72	28.1
Pre-pregnancy nutritional status		
Underweight	24	9.4
Normal weight	145	56.9
Overweight	62	24.3
Obese	24	9.4
Smoker		
Yes	32	12.5
No	224	87.5
Consume alcohol		
Yes	14	5.5
No	242	94.5
Model of health care in the unit were prenatal care delivered		
Family Health Care Strategy	104	40.6
Traditional	152	59.4

Per capita household income (p = 0.65) and maternal schooling (p = 0.22) were not associated with being insufficiently active in the univariate analyses. Pregnant women with excess weight had a lower chance of being insufficiently active (PR = 0.85; 95%CI 0.73;0.99, p = 0.048). A similar result was observed for those with one or more previous births. These results were independently associated with maternal schooling and maternal age, potential confounding factors (Table 4).

Of the behavioral variables, smoking (p = 0.33) was not associated with being insufficiently active, and nor was the score for consuming unhealthy food (p = 0.40).

Table 2. Distribution of pregnant women according to doing leisure time physical activity and level of physical activity. Botucatu, SP, Southeastern Brazil, 2010.

Variable	n	%
Walk in leisure time		
Yes	69	26.9
No	187	73.1
Walk quickly in leisure time		
Yes	26	10.2
No	230	89.8
Other physical activities in leisure time[a]		
Yes	15	5.9
No	241	94.1
Managing 150 minutes/week of moderate/ vigorous physical activities in leisure time		
Yes	26	10.2
No	230	89.8
Level of physical activity		
Sedentary/not very active	199	77.7
Moderately active	32	12.5
Vigorously active	25	9.8

[a] Pool (swimming or hydra-gymnastics), yoga, dance, ball games, cycling

Eating healthy food less frequently (1st or 2nd tercile, compared with those pregnant women with consumption in the 3rd tercile) slightly increased the likelihood of being insufficiently active, irrespective of pre-pregnancy nutritional status, maternal age or previous births. The health care model was not related to the pregnant women's level of physical activity (Table 4).

The analyses to identify possible factors associated with achieving the recommended 150 minutes of physical activity in leisure time only revealed a negative effect from working outside of the home, PR = 0.39, 95%CI 0.16;0.0 (Table 5). The other factors in question were not associated with this outcome.

Table 3. Descriptive statistics of daily energy expenditure of the pregnant women according to type of physical activity. Botucatu, SP, Southeastern Brazil, 2010.

Type of activity	Median	p25;p75	Mean	(sd)
Total energy expended[a]	20.41	15.5;27.92	22.15	9.50
Home based	9.93	6.20;14.28	10.70	6.02
Commuting	7.20	4.13;11.79	8.75	6.68
Occupational[b]	3.79	1.25;10.07	6.38	6.42
Leisure	0.00	0.00;0.34	0.31	0.65
Sedentary	3.00	1.50;6.00	3.81	2.70

[a] Total daily energy expended except hours of sleep
[b] Occupational activities (n = 108)

Table 4. Association between insufficiently active pregnant women and socioeconomic factors, maternal characteristics and behavior and model of care in the health care unit. Botucatu, SP, Southeastern Brazil, 2010.

Variable/Category	n	Insufficiently active (%)	Raw PR	95%CI	Adjusted PR[a]	95%CI
			Block 1			
Per capita income (MW)			p = 0,650			
1.0 and +	43	83.7	1		–	–
0.5 a 0.9	103	74.8	0.96	0.82;1.11	–	–
< 0.5	110	78.2	1.07	0.91;1.26	–	–
Schooling (years)			p = 0.217			
≥ 8	201	79.6	1	–	–	–
< 8	55	70.9	0.89	0.74;1.07	–	–
			Block 2			
Age			p = 0.076			
18 to 34	232	79.7	1	–	–	–
35 and +	24	58.3	0.73	0.52;1.03	–	–
Previous births			p = 0.008		p = 0.040	
None	101	86.1	1	–	1	–
1 or + births	155	71.7	0.84	0.74;0.96	0.88	0.77;0.99
Pre-pregnancy excess weight			p = 0.039		p = 0.047	
No	169	82.3	1	–	1	–
Yes	86	69.8	0.85	0.73;0.99	0.85	0.73;0.99
			Block 3			
Smoker			p = 0.334			
No	224	79.3	1	–	–	–
Yes	32	73.0	0.92	0.78;1.09	–	–
Healthy eating score			p = 0.005		p = 0.023	
3rd tercile	108	68.5	1		1	–
1st or 2nd tercile	148	84.5	1.23	1.07;1.43	1.18	1.02;1.36
Unhealthy eating score			p = 0.397			
1st tercile	82	74.4	1	–	–	–
2nd or 3rd tercile	174	79.3	1.07	0.92;1.24	–	–
			Block 4			
Health care model			p = 0.722			
Family Health Care Strategy	104	77.0	1	–	–	–
Traditional	152	78.8	1.02	0.90;1.17	–	–

[a] Block 1: schooling (variable of adjustment for the following blocks); Block 2: Block 1 + previous births + pre-pregnancy excess weight + age (variable of adjustment); Block 3: Block 2 + healthy eating score

DISCUSSION

Most low-risk pregnant women cared for in the public health primary care network of a medium sized municipality in the state of Sao Paulo predominantly carried out domestic and/or occupational activities not requiring a great physical effort, and sedentary activities in their leisure time. As a consequence, the proportion of pregnant women exposed to health problems associated with insufficient physical activity[20] is high.

Pregnant women tend to reduce their physical activity as the pregnancy progresses[5] and the pregnant women in this study were assessed in the second trimester of their pregnancies. Thus, higher rates of insufficiently active pregnant women may be observed if the study also involved women in the third trimester. Being active in the third trimester is a protection factor against prematurity[13] and reducing the proportion of children born prematurely is one of today's most important challenges in reducing the neonatal mortality rate in Brazil.[22]

Table 5. Association between managing 150 min/week of leisure time physical activities and socioeconomic factors, maternal characteristics and behavior and model of care in the health care unit. Botucatu, SP, Southeastern Brazil, 2010.

Variable/Category	n	150 min/week of PA in leisure time (%)	Raw PR	95%CI	Adjusted PR[a]	95%CI
			Block 1			
Per capita income (MW)			p = 0.362			
1.0 and +	43	7.0	1		–	–
0.5 a 0.9	103	9.7	0.82	0.38;1.79	–	–
< 0.5	110	11.8	0.59	0.18;1.97	–	–
Schooling (years)			p = 0.214			
≥ 8	201	11.4	1	–	–	–
< 8	55	5.5	0.48	0.15;1.53	–	–
Working outside of the home			p = 0.048		p = 0.034	
No	148	13.5	1	–	1	
Yes	108	5.6	0.41	0.17;0.99	0.39	0.16;0.93
			Block 2			
Age			p = 0.260			
18 to 34	232	9.5	1	–	–	–
35 and +	24	16.7	1.75	0.66;4.69	–	–
Previous births			p = 0.821			
None	101	10.9		–	–	–
1 or + births	155	10.0	0.92	0.44;1.92	–	–
Pre-pregnancy excess weight			p = 0.237		p = 0.301	
No	169	11.8	1	–	1	
Yes	86	7.0	0.59	0.25;1.42	0.63	0.27;1.50
			Block 3			
Smoker			p = 0.441			
No	224	9.3	1	–	–	–
Yes	32	12.5	1.36	0.62;2.98	–	–
Healthy eating score			p = 0.666			
3ord tercile	108	11.1	1	–	–	–
1st or 2nd tercile	148	9.5	0.85	0.41;1.77	–	–
Unhealthy eating score			p = 0.560			
1st tercile	82	8.5	1	–	–	–
2nd or 3rd tercile	174	10.9	1.28	0.56;2.93	–	–
			Block 4			
Health care model			p = 0.854			
Family Health Care Strategy	104	9.9	1	–	–	–
Traditional	152	10.6	1.07	0.51;2.24	–	–

[a] Block 1: schooling + working outside of the home; Block 2: Block 1 + pre-pregnancy excess weight

Some (9.8%) of the pregnant women studied were classified as vigorously active, a category which adversely affects pregnancy outcomes.[23] Educational activities promoting physical activity during pregnancy need to indicate the appropriate type, frequency and intensity of activities. Pregnant women with occupational activities requiring more physical effort than appropriate should be advised to reduce them.

When considering that pregnant women do at least 150/week of moderate/intense free time physical activity, the picture is even more unsatisfactory, with only 10.0% meeting this recommendation. This result shows the need for more studies in order to understand this situation and test ways of changing it.

This study had adequate internal validity. The representative sample of the population cared for by the

Sistema Único de Saúde (SUS – Brazilian Unified Health System) was studied with the aim of accurately estimating the prevalence of doing insufficient physical activity in leisure time. Faced with the lack of information on factors associated with these outcomes in this population, associations were tested to support interventions within the SUS. Even with the lower power of the test, given the sample size, it was possible to detect that, for pregnant women, working outside of the home was a potential obstacle to doing the recommended amount of leisure time physical activity. The other associations may not have been detected due to the homogenous socioeconomic profile of the sample and/or due to insufficient sample size, and further studies are necessary.

With regards external validity, it is plausible to assume that the prevalence of insufficiently active pregnant women, and of those who manage to do 150 minutes of leisure time physical activity can be extrapolated for the SUS clientele of pregnant women living in medium sized cities in the Southeast of Brazil. The results obtained, added to those reported in a recent study in another municipality,[5] suggest that the lack of physical activity during pregnancy is an important public health problem in Brazil.

The situation of the pregnant women assessed does not appear to be worse than that of women in general. However, a methodologically equivalent study evaluating women of childbearing age cared for by the SUS, which would allow for comparisons, was not found. According to VIGITEL, 10.3% of adult women in the municipality of Sao Paulo, SP, did 150 minutes of leisure time physical activity (women aged over 18 who did 30 minutes per day of mild or moderate physical activity five days a week or more, or 20 minutes of vigorous physical activity three days or more a week). When only women of reproductive age (18 to 44) were considered, the Vigitel figure was around 10.0% (varying between 9.4% and 10.4%).

Comparison of the prevalence of insufficiently active pregnant women and of those who did and did not manage 150 minutes/week of leisure time physical activities with the rates of prevalence reported in other Brazilian studies of pregnant women is limited due to the use of different methodologies for assessing physical activities and due to differences in the socioeconomic profile of the samples. A study carried out in Rio Grande, RS, Southern Brazil, in 2007,[7] evaluated physical activity during pregnancy in a post-partum sample population with one single question (Did you do physical exercise during pregnancy?), in contrast with this study, which used a broad questionnaire (PPAQ) developed to estimate the intensity and time the pregnant women spent doing different physical activities.

A cohort study of live births carried out in Pelotas, RS, in 2004 had a methodology comparable to this study with regards assessing leisure time physical activity during pregnancy. Of those women, also in the second trimester, who did leisure time physical activity, the median in Pelotas[5] was 160 minutes/week, whereas the figure was 90 minutes/week in Botucatu. This difference may be due to the lower socio-economic level of the population studied in Botucatu, as all were being cared for the public health care service, whereas in Pelotas the sample was representative of the population.

The predominant level of physical activity was sedentary/slightly active or insufficiently inactive, a situation more frequent in those pregnant women with lower levels of consuming healthy food. This suggests a cluster of risk factors, a result consistent with the international recommendation for interventions involving eating habits and patterns of physical activity in pre-natal care.[2,9]

When compared with those reported by Schmidt et al[16] (2006) for pregnant women in the US, the energy expenditure per type of physical activity showed differences relevant to the design of local interventions. Pregnant women in Brazil, on average, used almost six times as much energy on commuting, and almost four times less energy on leisure activities. Investment is necessary in this latter component, the component most amenable to modification through health care service interventions and policies promoting environments that encourage physical exercise. This comparison has limitations as hours of sleep were not assessed in this study as they were in the American study.

No national studies were found that indicated factors associated with reaching the recommended weekly amount of leisure time physical activities for pregnant women. Managing to do 150 min/week of physical activity was not influenced by the variables studied, except the negative association with working outside of the home. Working outside of the home being highlighted as a possible obstacle to doing physical activity merits more attention, considering that 42.2% of the pregnant women studied worked in this way. Understanding this result and finding ways to affect it is relevant to promoting pre-natal leisure time physical activity.

Paid work during pregnancy, irrespective of individual socioeconomic level or the social capital index of the municipality, played a positive role in the quality of pre-natal care in a broad study of post-partum women cared for by the SUS in two medium sized municipalities in the state of Rio de Janeiro, suggesting that working pregnant women value health care more than other who are not working.[12] The negative effect of working on doing leisure time physical activity in pregnant women on low income is probably due to

the time limits it imposes, as they possibly use their remaining time to carry out domestic tasks (caring for children and/or elderly family members), i.e., having a double working day.

A recent American qualitative study identified that pregnant women on a low income believed that their day-to-day activities already involved enough physical activity and stated that they did not do exercise due to tiredness or physical discomfort due to pregnancy. The priority for these pregnant women in terms of changing behavior while pregnant was cutting out smoking and drinking and trying to eat more fruit and vegetables. Pregnant women in higher income bands, on the other hand, were concerned about adopting their exercise routine to lower impact physical activities and seeking strategies to manage increased appetite and the desire to eat energy dense, tasty foods. These pregnant women believed they could control their weight gain to some extent, in contrast to their lower income counterparts, and that keeping active during pregnancy would contribute to this objective.[15]

Qualitative studies may assess the role that lack of time, a double working day or the perception of physical activity load at work or from domestic activities plays in limiting doing leisure time physical activities in pregnant women on low incomes in Brazil.

The fact that walking was almost the only type of exercise reported supports its prioritization in local interventions. This leisure activity is a type of exercise within reach of the low income population, as it is free and requires no equipment. However, for pregnant women, some guidance (on lack of contra-indications, duration and intensity suitable to each situation of pre-pregnancy physical activity) is needed in addition to a favorable environment: safe, well paved and illuminated streets.

In addition to training health care service professionals in giving appropriate guidance on walking for pregnant women, inter-sector actions focusing on the environment are necessary as part of interventions promoting pre-natal walking. For pregnant women who do not work outside the home, walking groups lead by a trained health care professional could be tested. The availability of social support able to provide care for the children of those pregnant women with children during the walk would also need to be offered, where necessary.

Considering the importance of leisure time physical activity during pregnancy for the health of mother and baby, the possibility of working pregnant women walking at their place of work during the working day, or working reduced hours in order to do this activity, deserves to be the object of public policies, similar to what occurs with breastfeeding.

Women who were overweight before pregnancy are more active than those of normal weight or underweight, as has been previously reported in Brazil.[6] This differs from the findings of international studies[4,9] on the impact of interventions aiming at promoting physical activity in pregnancy, in which pregnant women who are overweight were the group with the worst results. The behavior of overweight pregnant women in Brazil appears to differ, confirming the importance of local studies on the situation and determinants of leisure time physical activity during pregnancy.

REFERENCES

1. American College of Obstetricians and Gynecologists. Exercise during pregnancy and the postpartum period. *Clin Obst Gynecol*. 2003;46(2):496-9.
2. American Dietetic Association; American Society for Nutrition, Siega-Riz AM, King JC. Position of the American Dietetic Association and American Society for Nutrition: obesity, reproduction, and pregnancy outcomes. *J Am Diet Assoc*. 2009;109(5):918-27. DOI:10.1016/j.jada.2009.03.020
3. Chasan-Taber L, Schmidt MD, Roberts DE, Hosmer D, Markenson G, Freedson PS. Development and validation of a pregnancy physical activity questionnaire. *Med Sci Sports Exerc*. 2004;36(10):1750-60.
4. Dodd JM, Grivell RM, Crowter CA, Robinson JS. Antenatal interventions of overweight or obese pregnant women: a systematic review of randomized trials. *BJOG*. 2010;117(11):1316-26. DOI:10.1111/j.1471-0528.2010.02540.x
5. Domingues MR, Barros AJD. Leisure-time physical activity during pregnancy in the 2004 Pelotas Birth Cohort Study. *Rev Saude Publica*. 2007;41(2):173-80. DOI:10.1590/S0034-89102007000200002
6. Drehmer M, Camey S, Schmidt MI, Olinto MTA, Giacomello A, Buss C, et al. Socioeconomic, demographic and nutritional factors associated with maternal weight gain in general practices in Southern Brazil. *Cad Saude Publica*. 2010;26(5):1024-34. DOI:10.1590/S0102-311X2010000500024
7. Dumith SC, Domingues MR, Mendoza-Sassi RA, César JA. Atividade física durante a gestação e associação com indicadores de saúde materno-infantil. *Rev Saude Publica*. 2012;46(2):327-33. DOI:10.1590/S0034-89102012005000012
8. Fornés NS, Martins IS, Velásquez- Meléndez G, Latorre MRDO. Escores de consumo alimentar e níveis lipêmicos em população de São Paulo, Brasil. *Rev Saude Publica*. 2002;36(1):12-8. DOI:10.1590/S0034-89102002000100003
9. Gardner B, Wardle J, Poston L, Croker H. Changing diet and physical activity to reduce gestational weight-gain: a meta-analysis. *Obes Rev.* 2011;12(7):e602-20. DOI:10.1111/j.1467-789X.2011.00884.x
10. Institute of Medicine. Weight gain during pregnancy: reexamining the guidelines. Washington (DC): The National Academy Press; 2009.
11. Knuth AG, Bachieri G, Victora CG, Hallal PC. Changes in physical activity among Brazilian adults over five-year period. *J Epidemiol Community Health*. 2010;64(7):591-5. DOI:10.1136/jech.2009.088526
12. Leal MC, Pereira APEP, Lamarca GA, Vettore MV. The relationship betewween social capital, social support and adequate use of prenatal care. *Cad Saude Publica*. 2011;27(Suppl 2):S237-53. DOI:10.1590/S0102-311X2011001400011
13. Matijasevich A, Domingues MR. Exercício físico e nascimentos pré-termo. *Rev Bras Ginecol Obstet*. 2010;32(9);415-9. DOI:10.1590/S0100-72032010000900001
14. Nucci LB, Duncan BB, Mengue SS, Branchtein L, Schimidt MI, Fleck ET. Assessment of weight gain during pregnancy in general prenatal care services in Brazil. *Cad Saude Publica*. 2001;17(6):1367-74. DOI:10.1590/S0102-311X2001000600020
15. Paul KH, Graham ML, Olson CM. The web of risk factors for excessive gestational weight gain in low income women. *Mater Child Health J*. 2013;17(2):344-51. DOI:10.1007/s10995-012-0979-x
16. Schmidt MD, Freedson OS, Pekow P, Roberts D, Sternfeld B, Chasan-Taber L. Validation of the Kaiser Physical Activity Survey in pregnant women. *Med Sci Sports Exerc*. 2006;38(1):42-50.
17. Silva FT, Costa FS. Transcultural adaptation of the pregnancy physical activity questionnaire-PPAQ to Portuguese: a tool for evaluation of physical activity in Brazilian pregnant. *FIEP Bull*. 2009;79(Spec Ed):318-22.
18. Streuling I, Beyerlein A, Rosenfeld E, Hofmmann H, Schultz T, Von Kries R. Physical activity and gestational weight-gain: a meta-analysis of intervention trials. *BJOG*. 2011;118(3):278-84. DOI:10.1111/j.1471-0528.2010.02801.x
19. Stulbach TE, Benício MHDA, Andreazza R, Kono S. Determinantes do ganho ponderal excessivo durante a gestação em serviço público de pré-natal de baixo risco. *Rev Bras Epidemiol*. 2007;10(1):99-108. DOI:10.1590/S1415-790X2007000100011
20. Takito MY, Benício MHDA, Neri LCL. Physical activity by pregnant women and outcomes for newborns: a systematic review. *Rev Saude Publica*. 2009;43(6):1059-69. DOI:10.1590/S0034-89102009005000074
21. Tavares JS, Melo ASO, Amorim MMR, Barros VO, Takito MY, Benício MHDA. Padrão de atividade física entre as gestantes atendidas pela estratégia saúde da família de Campina Grande - PB. *Rev Bras Epidemiol*. 2009;12(1):10-9. DOI:10.1590/S1415-790X2009000100002
22. Victora CG, Aquino EML, Leal MC, Monteiro CA, Barros FC, Szwarawald CL.Saúde de mães e crianças no Brasil: progressos e desafios. *Lancet*. 2011;6736(11):60138-4.
23. Zavorsky GS, Longo LD. Adding strength training, exercise intensity and caloric expenditure to exercise guidelines in pregnancy. *Obstet Gynecol*. 2011;117(6):1399-402. DOI:10.1097/AOG.0b013e31821b1f5a

This study was supported by the *Fundação de Amparo à Pesquisa do Estado de São Paulo* (FAPESP – Process no. 09/51470-1, 2009).
This study was presented at the 8th International Conference on Diet and Activity Methods, Italy, 2012.
The authors declare that there are no conflict of interests.

HIGHLIGHTS

The article looks at the low proportion of pregnant women who do physical activities of the frequency, duration and intensity sufficient to provide protection against the relevant adverse outcomes, such as prematurity, gestational diabetes and pre-eclampsia, among others. Pre-gestational diabetes and excessive weight gain during pregnancy have become significant health problems over the last few decades, increasing the relevance of studies of physical activity in pregnant women and women of childbearing age in order to better design interventions.

Sedentarism and insufficient leisure time physical activity are common throughout the adult population and physical activity is becoming increasingly prioritized in the National Policy for the Promotion of Health. There is a window of opportunity for health care actions in the ante-natal period (promoting and supporting walking) which could impact positively on mother and baby.

A high rate of pregnant women (77.7%) were found to be insufficiently active, and only 10.2% did the recommended 150 min of leisure time physical activity per week, with walking being the most common activity. Working outside of the home, having previously given birth once or more and pre-gestational excess weight increased the likelihood of sedentarism.

Professor Rita de Cássia Barradas Barata
Scientific Editor