148 - RESISTANCE EXERCISE IN PREGNANT WOMEN FUNCTIONAL AUTONOMY

ROSIVALDO SACRAMENTO CALDAS[1]
SILVIO ROMERO BUARQUE DE GUSMÃO[2]
[1]Professor Assistente e Professor Titular[2] do Departamento de Morfologia e Ciências Fisiológicas,
Universidade do Estado do Pará – UEPA, Belém/PA-Brasil
E-mail:dmcfuepa@hotmail.com

INTRODUCTION

The pregnancy status triggers for most women an interference in the ability to perform daily activities independently. Regular physical activity, affords pregnant fitness and functional capacity for daily life activities (DLA), the delivery performance and its recovery in the post-partum1,2,3,4.

The practice of physical activity during pregnancy is part of prenatal care in some countries5,6,7. In Brazil this reality has not been achieved by the prenatal.

The American College of Obstetricians and Gynecologists8, the American College of Sports Medicine9 and the Ministry of Health10 recognize that regular physical activity during pregnancy improves aerobic and muscular fitness, the weight gain control during this period and the recovery and establishment of a healthy lifestyle in the postpartum period.

Medical literature has shown that appropriate exercise of muscular endurance are extremely important during pregnancy, where they develop muscle mass, maintain the strength, the resistance of the pregnant woman, promote adjustment of posture, reduce pain and encourage better implementation of daily activities5,11,12,13.

Resistance training is the instrument that best applies to physical fitness and general health of the pregnant woman with an emphasis on improving the functional capacity5,11. The application of physical tests and concomitant use of resistance exercise in pregnant women, because it is a special group should be conducted with methodological rigor and care for this population.

In this study a group of pregnant women underwent a program of resistance exercise and tested their functional autonomy as well.

METHODS

We selected 11 women of the pre-natal Health Center at the University of the State of Pará/UEPA, who volunteered to participate in this study conducted at the Resistance Exercise and Health (REHL) and Multipurpose Laboratory (ML) of UEPA. All aged 18 to 28 years, sedentary, without participating in any resistance training program in the past six months, with gestational ages from 16 to 20 weeks; nulliparous or primiparous necessarily with singleton pregnancies and without histories of complications in the current pregnancy, physically able to perform daily activities independently in their day-to-day (without help from others). The women were divided randomly into two groups: experimental group (EG) composed of six participants and control group (CG) composed of five participants.

The two groups were submitted at the beginning and end of the study the following: anthropometric assessment, following the recommendations of Fernandes Filho14, test of strength for which a handgrip dynamometer was used15,16; two minutes stationary march test17,18 and autonomy evaluation tests, when pregnant women underwent the following procedures: 1) Up and sit on the toilet (UST). We used a wooden toilet, developed by our team to offer convenience and concreteness to the test. The woman stood up and sat down seven times, checking the time lapse in activity; 2) Lift and pour the bed (LPB). We used a single wooden bed, with semi-orthopedic foam. A woman stood up and lay four times. At the end of the task the time was taken; 3) Up and Down Stairs (UDS). We used a ladder inside the building of the Physical Education Course of UEPA composed of 10 steps. The women went down the stairs once. At the end of the task the time used was measured; 4) Reach, Move, Walk and Deposit Object (RMWDO). A woman caught with both hands an object of 2.5 kg of a shelf 1.60 m high, made a journey of 8 meters and placed on another shelf with the same height, repeating the procedure in the opposite direction. At the end of the test, the time used was checked; 5) Crouch, Hold and Walk (CHW). A woman walked 8.0 meters in straight line and returned, carrying a 2.0kg shopping bag in each hand. At the end of the test was checked the time spent. All assessment procedures were applied by the same observer in a controlled room of ML UEPA.

Continuing the study, only the EG underwent a resistance exercise program, following the modified protocols of Fleck & Kraemer19 and Stoppani20. Sets of 8 to 12 repetitions were performed, at intervals of 1 to 2 minutes on six alternating exercises per body segment, using the supine position, leg press 45, seated row, calf in leg press 45, abdominal and puller. The exercises had a frequency of three weekly sessions, lasting an average of 50 minutes.

To determine the initial levels of strength and training prescription, the OMNI resistance exercise scale was adopted. It was established, as initial load, values of 6 and 8 on the scale of subjective perception. The perception of stress of the pregnant woman was assessed as: 1) a little difficult, for score 6 and 2) difficult, for score 8, after performing 12 repetitions for each exercise load. For abdominal exercise was not used weights.

The study was approved by the Ethics Committee of the Course of Physical Education, University of the State of Para/ UEPA (CAAE: No 0037.0.412.000-09).

The data presented in tables and graphs were processed with SPSS 16.0, which adopted the descriptive statistics to characterize the sample, the frequency distribution to show the prevalence and the Student t test to compare the differences between the two times of testing and between the two groups. For the analysis, $p \leq 0.05$ was adopted.

RESULTS

Table 1: Distribution of functional autonomy evaluation test results in pregnant women in CG performed at initial (16 th-19 th week) and final (35 th-37 th week) monitoring.

Variable	Initial	Final	P
UST	28.06 ± 8.66	36.68 ± 10.89	<0.01*
LPB	32.55 ± 6.73	43.94 ± 11.53	<0.01*
USD	15.03 ± 2.12	20.37 ± 2.78	0.02*
RMWDO	20.09 ± 4.61	26.35 ± 3.36	<0.01*
CHW	22.89 ± 3.53	27.07 ± 5.08	0.02*
STRENGTH RH	27.00 ± 5.43	21.20 ± 3.63	0.03*
STRENGTH LH	23.20 ± 5.76	18.60 ± 4.83	<0.01*
MARCH	91.00 ± 4.30	76.20 ± 4.27	<0.01*

*Student t test for paired samples.

Legend: = UST up and sit on the toilet; LPB = lift and pour the bed; UDS = up and down stairs; RMWDO = reach, move, walk and deposit object, CHW = crouch, hold and walk; STRENGTH RH = right hand strength; STRENGTH LH = left hand strength; MARCH.

The control group with age between 16-19 weeks was submitted to an assessment of its functional autonomy in the initial phase of the study. This group which maintained only daily live activities was reassessed in the final phase of the study between 35-37 weeks, when it was observed in all pregnant women, that the increase of gestational age led to an extension of time for tests UST (p<0.01); LTB (p<0.01), USD (p=0.02); RMWDO (p<0.01) and CHW (p=0.02). In relation to the topic STRENGTH it was observed a significant decrease in the manual strength tests. There was found that the average strength of the right hand was 27 kg and the left hand of 23.2 kg in the initial phase between 16-19 weeks, then decreasing to 21.2 kg in the right hand and 18.6 kg in his left hand in final phases with a gestational age of 35-37 weeks. Also in the MARCH test evaluation, there was a drop in performance with the evolution of gestational age. Observing Table 1.

Table 2: Distribution of functional autonomy evaluation test results in pregnant women in EG performed at initial (16 th-20 th week) and final (33 th-38 th week) monitoring.

Variable	Initial	Final	P
UST	24.99 ± 4.90	25.99 ± 6.62	0.74
LPB	40.49 ± 10.13	44.07 ± 8.81	0.08
UDS	15.62 ± 2.05	16.80 ± 3.37	0.51
RMWDO	21.28 ± 5.42	20.99 ± 2.88	0.91
CHW	21.84 ± 3.03	21.61 ± 2.19	0.73
STRENGTH RH	25.67 ± 3.50	26.67 ± 4.59	0.63
STRENGTH LH	24.67 ± 5.61	27.50 ± 6.78	0.20
MARCH	79.67 ± 6.19	88.50 ± 10.13	0.01*

*Student t test for paired samples.

Legend: = UST up and sit on the toilet; LPB = lift and pour the bed; UDS = up and down stairs; RMWDO = reach, move, walk and deposit object, CHW = crouch, hold and walk; STRENGTH RH = right hand strength; STRENGTH LH = left hand strength; MARCH.

The GE with age between 16-20 weeks was submitted during the initial assessment of its functional autonomy and was re-evaluated in the final stage in the period between 33-38 weeks of gestation, after undergoing a resistance exercises program. It was observed that with the advancing gestational age there was no reduction of functional autonomy in all pregnant women group involved in the training UST (p=0.74), UPB (p=0.08), UDS (p=0.51); RMWDO (p=0.91) and CHW (p=0.73). Also there was no reduction in the indices of the variable STRENGTH RH (p=0.63) and STRENGTH LH (p=0.20) when evaluated after introduction of the program. Regarding the tests of March, there was a better performance of women, as measured by an increase in the number of steps to perform both the MARCH (p=0.01). Observing Table 2.

Table 3: Change in differences between the two times of testing between the groups.

Variable	Control Group	Experimental Group	P
UST	8.61 ± 2.47	2.67 ± 8.75	0.17
LPB	11.40 ± 4.95	3.59 ± 4.03	0.02*
UDS	5.35 ± 2.93	1.18 ± 4.12	0.09
RMWDO	6.25 ± 2.68	-0.29 ± 5.72	0.04*
CHW	4.18 ± 2.38	-0.23 ± 1.49	<0.01*
STRENGTH RH	-5.80 ± 3.90	1.00 ± 4.82	0.03*
STRENGTH LH	-4.60 ± 1.82	2.83 ± 4.71	0.01*
MARCH	-14.80 ± 4.87	9.50 ± 5.05	<0.01*

*Student t test for paired samples.

Legend: = UST up and sit on the toilet; LPB = lift and pour the bed; UDS = up and down stairs; RMWDO = reach, move, walk and deposit object, CHW = crouch, hold and walk; STRENGTH RH = right hand strength; STRENGTH LH = left hand strength; MARCH.

Comparing the results for each study group between the two phases of testing, the final stage, gestational age 35-37 weeks for the CG and the final stage, gestational age 33-38 weeks for the GE showed significant differences. The CG showed intense worsening in all variables when evaluated. For LPB variable (p=0.02), the GE presented at the second assessment, in the same way, a deterioration in their results, but significantly lower than the results of the CG. The observation of variable RMWDO (p=0.04) showed that EG had the best performance and showed a significant difference in the level of deterioration shown by CG. Also, the same behavior was observed in the variables UDS (p<0.01), STRENGTH RH (p=0.03), STRENGTH LH (p=0.01) and MARCH (p<0.01). Observing Table 3.

Table 4 - Comparison between the study groups for the variables of chronological age and gestational age, body mass index and parity.

Variable	C. Group	E. Group	t	p
Cronological Age	22.80 ± 3.11	22.83 ± 3.54	-0.02	0.99
Gestational Age	17.40 ± 1.14	18.33 ± 1.63	-1.07	0.31
Body Mass Index	26.56 ± 3.45	22.45 ± 3.43	1.97	0.08
Parity	1.00 ± 0.00	1.33 ± 0.52	-1.58	0.17

As shown in Table 4, there was no statistical difference between control and experimental groups for the variables of chronological age, gestational age, the body mass index and parity in the study. It is evident that women in the experimental group

gestational age and parity slightly higher than in the control group, while women in the control group had a body mass index higher than the experimental group. None of these differences was significant from a statistical viewpoint.

DISCUSSION

The results showed that pregnant women in the EG showed no changes in its functional autonomy with advancing age and changes of pregnancy status. Resistance exercises of moderate intensity, three times a week, expressed this performance: p=0.74 for the test UST, p=0.08 for LPB, p=0.51 for UDS, p=0.91 for RMWDO p=0.73 for CHW. Also there was a good performance during the evaluation of STRENGTH RH (p=0.63) and STRENGTH LH (p=0.20). The MARCH test (p=0.01) was significant in all pregnant women in this group. The sedentary pregnant group showed significant reduction of operational autonomy for the tests UST (p<0.01); LPB (p<0.01), UDS (p=0.02); RMWDO (p<0.01) and CHW (p=0.02). In this group there was a significant reduction in STRENGTH RH (p=0.03) and STRENGTH LH (p<0.01), which also occurred in the MARCH (p<0.01). The sedentary women have physical conditioning limitations.

Our results show that the EG had a better performance than CG, which can be interpreted as the efficiency of application of resistance exercise in improving physical conditioning, and improving functional capacity in the experimental group, even considering the major changes, especially contribution of weight in pregnant women studied. This conclusion is reaffirmed by the results obtained in the second evaluation of the CG, where there was a reduction of operational autonomy, with a significant increase in time taken to perform the tests Up and Sit on the Toilet; Lift and Pour the Bed, Up and Down Stairs; Reach , Move, Walk and Deposit Object, Crouch, Hold and Walk, where the woman was slower in all these tests. This group showed decreased grip strength in its right and left hand and lower resourcefulness in the Stationary March test.

The proposed tests to verify the functional autonomy, as well as STRENGTH and MARCH tests, applied in the CG showed variable significance level of $p \leq 0.01$ and p=0.03, demonstrating effectiveness in this study.

The autonomy and functional capacity is related to the measure of prevention degree of the person to perform daily life activities21. In this study the experimental group presented at the 38th week of gestation, consistent levels with the autonomy assessed at week 16. These results are shown in Table 02. There was no reduction of autonomy, which improved in the march test, indicated by p<0.01.

The performance of women in the GE shown in Table 02 shows not to have occurred reduction of the power and strength and significant performance in the March test. These facts coincide with Feigenbaum's results22. The author prescribes resistance exercise to maximize the adjustments, which results in muscle hypertrophy, power, strength and athletic performance. Ploutz-Snyder recommends that adequate levels of strength and flexibility are increasing the ability to minimize postural exaggerations, such as thoracic kyphosis and lumbar lordosis, which often accompany pregnancy22.

Comparing the results obtained by the two groups in the second evaluation, using scores and performance as criterion in testing as time elapsed, there was: 1) significant increase in time spent by CG to perform the tests UST, LPB, UDS, RMWDO, CHW, STRENGTH RH and STRENGTH LH reduction and increasing the number of steps during MARCH; 2) the EG showed neither significant increase in time for the testing of autonomy UST, LPB, UDS, RMWDO, CHW nor decrease in test STRENGTH RH, STRENGTH LH. There was significant increase of autonomy in March test, which allows pregnant women to say that EG did not show reduction of their autonomy in the development of pregnancy.

The EG proved itself significantly superior than the GC in the tasks of LPB, RMWDO, CHW, RH, LH STRENGTH and MARCH.

The best performance of women on the EG compared with CG observed in the study can be justified by the absence of CG in the resistance exercise program during the study. The results of the tests of EG STRENGTH LH (p=0.20) and MARCH (p=0.01) indicate among other possibilities the fitness level of the women of this group. Only the physically conditioned pregnant women of EG showed no decrease of autonomy for the tests.

The regular physical resistance activity, systematic and planned, is essential to maintaining or restoring functional capacity, regardless of stage of life1. Dias et al.24 in work with men and women found a significant gain in muscle strength in a period of eight weeks of weight training. This result emphasizes that resistance exercise is productive without distinction of sex. In our study we observed that the maintenance of functional autonomy of women in EG was strongly affected by their participation for sixteen weeks in the program of resistance exercises, even with the gains in muscle strength were significant.

CONCLUSIONS

1) The resistance exercise program of moderate intensity, applied in the experimental group, three times a week was able to provide organic changes of the various components of physical fitness and help maintain the autonomy of pregnant women;

2) Women in the experimental group proved to be, at end of the applied program, physically independent to deal with situations of daily life;

3) The sedentary control group shoed decreased functional capacity to perform the tasks of daily life;

4) The set of tests applied in this pilot study proved to be satisfactory adequate for evaluating the functional group of pregnant women studied;

5) Further studies evaluating the functional autonomy of pregnant women should be performed to determine the reproducibility of results with the methodology proposed here.

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Rosivaldo Sacramento Caldas, 82, Cidade nova 8, Tv WE 48,
Ananindeua/PA-Brazil, Zip Code: 67133310;
E-mail: rosivaldocaldas@yahoo.com.br
Phone Number: (91) 3263-9255 / 9112-9862.

RESISTANCE EXERCISE IN PREGNANT WOMEN FUNCTIONAL AUTONOMY

ABSTRACT

The study was to investigate the effects of resistance exercise in functional autonomy of pregnant women using a new methodological procedure. The study included 11 pregnant women, not trained, who were selected randomly in the experimental group (EG=six) and control group (CG=five). The experimental group underwent a program of resistance training during nearly 16 weeks in three weekly sessions. The CG was monitored but not subjected to the training program. The two groups were submitted at the beginning and end of the study the following: a) anthropometric measurements, b) test of grip strength of left and right hand, c) stationary march test d) autonomy evaluation test using the tasks - UST, LPB, UDS, RMWDO and CHW. The results of the tests in the final evaluation showed: 1) significant increase in CG time to perform the final evaluation of autonomy; loss of STRENGTH RH and STRENGTH LH and decrease in the number of steps during MARCH; 2) in the EG, the time remained unchanged for the autonomy test, there was no reduction of STRENGTH RH and STRENGTH LH and the MARCH test was recorded better performance of the pregnant woman. At the end of the study, indicators showed that the pregnant women of EG showed to be physically independent to deal with daily life situations, compared with sedentary women in the CG. The tests applied in this pilot study were adequate to assess the functional autonomy of pregnant women in the group.

KEYWORDS: Resistance exercise. Test of functional autonomy. Autonomy in pregnancy.

EXERCICES RESISTÉS SUR L´AUTONOMIE FUNCTIONNELLE DES FEMMES ENCEINTES

SOMMAIRE

L'objectif de cette étude était d'étudier les effets de l'entraînement resisté sur l'anatomie fonctionnelle des femmes enceintes en utilisant une nouvelle procédure méthodologique. Ont participé de l'étude 11 femmes enceinte non entraînées et qui ont été chosis de manière aléatoire dans les groupes expérimentaux (GE=six) e groupe de controle (GC=cinq). Le GE a été soumis à un programme d'entraînement d'une durée de 16 semaines, trois sections par semaine. Le GC a été acompagné sans être soumis à un programme d'entraînement.Les deus groupes ont été soumis au debut et a la fin de l'étude aux procédure suivantes: a) Évaluation anthropométrique, b) test de préhension de force avec la main droite et la gauche, c) test de marche stationnaires et d) test d'indépendance avec les preuves – LSVS, LDC, SDE, ACDO et ASC. Les resultas des tests apliqués sur l'evaluation final ont montrés: 1) Sur le GC une augmentation significative des temps necessaires pour d'effectuer l'évaluation finale de l'autonomie, perte de force MD et MG et une diminution du nombre de pas lors de la marche; 2) Dans le GE est resté imutable le temps d'achèvement des tests d'autonomie; pas de reduction de force MD ou MG; sur le test de MARCHE enregistrement d'une amelioration des femmes enceintes. Á la fin de l'etude les indicateurs ont montrés que celles du GE se presentaient physiquement independantes pour realiser les mouvements du jour le jour, comparés aux femmes sédentaires du GC. les critères appliqués dans cette étude pilote étaient suffisants pour évaluer le groupe fonctionnel des femmes enceintes.

MOTS-CLÉS : Exercices resistés. Teste d'autonomie fonctionnelle. Autonomie durant la grossesse

EJERCÍCIOS RESISTIDOS EN LA AUTONOMÍA FUNCIONAL DE EMBARAZADAS
RESUMÉN

El objetivo del estudio fue buscar los efectos de ejercicios resistidos en la autonomía funcional de mujeres embarazadas utilizándose un nuevo procedimiento metodológico. Hicieron parte Del estudio 11 embarazadas no trenadas, que fueran elegidas de manera aleatoria, en grupo experimental (GE=seis) y grupo control (GC=cinco). El GE fue sometido a un programa de trenamiento resistido con duración aproximada de 16 semanas, en 3 sesiones semanales. El GC fue acompañado sin ser sometido al programa de trenamiento. Los dos grupos fueron sometidos en el inicio y en el final del estudio a los siguientes procedimientos: a) evaluación antropométrica, b) teste de fuerza de presión manual derecha e izquierda, c)teste de marcha estacionaria y d) teste de evaluación de autonomía con las pruebas – LSVS, LDC, SDE, ADCDO y ASC. Los resultados de los testes aplicados en La evaluación final apuntaron: 1) en El GC significativo crecimiento en el tiempo para realizar las pruebas de evaluación de autonomía, disminución de la FUERZA MD (MANO DERECHA) y FUERZA MI (MANO IZQUIERDA) y disminución del número de pasos durante la MARCHA; 2) en el GE mantéese inalterado el tiempo para la realización de las pruebas de autonomia; no hubo reducción de la FUERZA MD Y FUERZA MI; en lo teste de la MARCHA hay un registro de un mejor desarrollo de la embarazada. Al final del estudio los indicadores demuestran que las embarazadas del GE presentabanse físicamente independientes para lograr éxito en las situaciones de la vida cotidiana, haciendo una comparación con las embarazadas sedentarias del GC. Los testes en este estudio piloto fueron adecuados para evaluar el grupo funcional de las mujeres embarazadas.

PALABRAS CLAVE: ejercicio resistido. Teste de la autonomía funcional. Autonomía en el embarazo.

EXERCÍCIOS RESISTIDOS NA AUTONOMIA FUNCIONAL DE GESTANTES
RESUMO

O objetivo do estudo foi investigar os efeitos de exercícios resistidos na autonomia funcional de mulheres gestantes utilizando-se um novo procedimento metodológico. Participaram do estudo 11 gestantes, não treinadas, que foram selecionadas aleatoriamente, em grupo experimental (GE= seis) e grupo controle (GC= cinco). O GE foi submetido a um programa de treinamento resistido com duração aproximada de 16 semanas, em três sessões semanais. O GC foi acompanhado sem ser submetido ao programa de treinamento. Os dois grupos foram submetidos no início e no final do estudo aos seguintes procedimentos: a) avaliação antropométrica, b) teste de força de preensão manual direita e esquerda, c) teste de marcha estacionária e d) teste de avaliação da autonomia com as provas - LSVS, LDC, SDE, ADCDO e ASC. Os resultados dos testes aplicados na avaliação final apontaram: 1) no GC significativo aumento no tempo para realizar as provas de avaliação da autonomia, diminuição da FORÇA MD e FORÇA ME e diminuição do número de passos durante a MARCHA; 2) no GE manteve-se inalterado o tempo para a realização dos testes da autonomia; não se observou redução da FORÇA MD e FORÇA ME; no teste da MARCHA registrou-se um melhor desempenho da gestante. Ao final do estudo os indicadores mostraram que as gestantes do GE apresentavam-se fisicamente independentes para lidar com as situações da vida diária, comparadas com as gestantes sedentárias do GC. Os testes aplicados neste estudo piloto mostraram-se adequados para avaliar a autonomia funcional no grupo de gestantes.

PALAVRAS-CHAVE: Exercício resistido. Teste de autonomia funcional. Autonomia na gravidez.

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