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HEART RATE AND BLOOD PRESSURE IN RESPONSE TO PELVIC FLOOR MUSCLE TRAINING DURING PREGNANCY

Hypothesis / aims of study

A recent Cochrane review has recommended pelvic floor muscle training (PFMT) during pregnancy to prevent urinary incontinence (1). No complications or side effects have been reported after PFMT, but attempts of maximal contraction with a holding period may increase blood pressure and heart rate. Anecdotally, some women complain of light headache and dizziness when starting a PFMT program. The aim of the present study was to assess whether heart rate (HR) and blood pressure (BP) change significantly in response to PFMT during pregnancy

Study design, materials and methods

This was a longitudinal clinical study with repeated measurements. Twenty-seven nulliparous sedentary pregnant women, with no illness or pregnancy complications participated in the study. The women were recruited at 18 weeks of gestation from different Health Units in one city in Brazil. They started with individual PFMT at 20 weeks of gestation supervised by physical therapists once a week at the University Hospital. PFMT consisted of four sets of 10 pelvic floor muscle (PFM) contractions sustained for six seconds with an interval of six seconds between each contraction. Three additional fast contractions were performed at the end of the ten repetitions (2). A 30-second interval was allowed between sets. The sets were performed with the woman in left lateral decubitus position, sitting, kneeling and standing. HR was monitored continuously during all exercise sessions using the frequency counter Polar Electro 810i ^{TM}. BP was measured before and after each session using a sphygmomanometer BD ^{TM}. Background variables are presented as frequencies and percentages. Data collection and analysis were carried out in session 20, 24, 28, 32 and 36 weeks of gestation. To compare HR and BP before and after training in each week and between different weeks, A linear regression model with mixed effects (fixed and random effects) was used. Maximum HR was calculated for each participant (220-age) as well as the percentage of individual reaching 60 to 70% of maximum heart rate.

Results

Mean age of the participants was 23,3 years (range 18-36) and mean body mass index (BMI) was 23,4 (range 23,1- 29,5). Table 1 shows the mean and standard deviation of systolic and diastolic BP and HR before and after the supervised PFMT sessions at 20,24,28 and 36 weeks of gestation. There was no statistical significant difference before and after the sessions in relation to BP. A significant difference related to HR before and after training sessions in all gestational weeks was found (20 weeks $p<0.01$; 24 weeks $p=0.02$, 28 weeks $p<0.01$, 32 weeks $p<0.01$ and 36 weeks $p<0.01$). In each week the following percentage of pregnant women reached a HR between 60 and 70% of maximum HR: 20 weeks: 59%, 24 weeks: 66.5% , 28 weeks: 56%, 32 weeks: 52% and 36 weeks: 26%. The percentage that exceeded 70% of maximum HR was: 15% at 20 weeks, 15% at 24 weeks, 7% at 28 weeks, 18,5% at 32 weeks and 18,5% at 36 weeks.

Interpretation of results

The results showed that PFMT during pregnancy did not change diastolic or systolic BP. However a significant increase in HR was found for a large percentage of women. According to the American College of Obstetrics and Gynecology (ACOG) (3) 60 to 70% of maximal heart rate appears to be an appropriate intensity of exercise for most sedentary pregnant women. However, monitoring heart rate to guide intensity during pregnancy is controversial and less precise as a result of the reduced maximal hearth rate reserve. To date there is also limited information about change in heart rate and possible consequences for mother and fetus during strength training. The present study found that between 7 and 18.5% of pregnant women reached a heart rate above 70% in response to a PFMT program. There is a need for further studies that could lead to a better understanding of these findings, including the use of ratings of perceived exertion and evaluation of fetal responses.

Concluding message

PFMT during pregnancy did not change BP. HR changed significantly in all training sessions and some women exceeded ACOG recommendations.

Table 1: Mean and standard deviation of systolic and diastolic BP and HR before and after supervised pelvic floor muscle training sessions at 20,24,28 and 36 weeks of gestation

Time	Gestational Week	n	Mean Blood Pressure Sistolic (S) Diastolic (D)	SD	Mean Heart Rate (HR)	SD
before	20	27 27	S108,04 D 66,81	13,47 10,09	89,37	12,03
	24	27 27	S108,41 D 62,37	14,59 12,23	93,78	9,01
	28	27 27	S109,78 D66,48	11,88 7,99	91,81	9,83
	32	27 27	S108,67 D 66,59	13,76 8,64	93,41	9,86
	36	27 27	S113,11 D 70,63	12,86 10,38	86,52	9,35
after	20	27 27	S109,00 D 64,59	13,84 11,00	101,22	17,56
	24	27 26	S108,19 D 59,92	11,26 8,84	100,93	13,27
	28	27 27	S 106,33 D 66,26	13,49 8,73	103,81	12,18
	32	27 27	S 111,67 D 68,52	13,99 10,16	102,26	13,14
	36	27 27	S 115,37 D 73,11	14,86 10,05	97,48	15,08

References

1. 1- Hay-Smith J, Mørkved S, Fairbrother KA, Herbison GP. Pelvic floor muscle training for prevention and treatment of urinary and faecal incontinence in antenatal and postnatal women. 2008 Cochrane Database of Systematic: CD007471.
2. 2- Morkved S, Bo K, Schei B, Salvesen KA Pelvic floor muscle training during pregnancy to prevent urinary incontinence: a single-blind randomized controlled trial. Obstet Gynecol. 2003 101(2):313-9
3. 3- Artal R, O`Toole M. Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period.

Specify source of funding or grant	**This study received funding from the Research Foundation of the State of São Paulo**
Is this a clinical trial?	**Yes**
Is this study registered in a public clinical trials registry?	**Yes**
Specify Name of Public Registry, Registration Number	**Assessment of muscle strength and perinatal and maternal effects resulting from the strengthening exercises of the pelvic floor in pregnancy** **ACTRN12609001083280** **Australian New Zealand Clinical Trials Registry**
Is this a Randomised Controlled Trial (RCT)?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**Ethics Committee of the Clinics Hospital of the Faculty of Medicine of Ribeirão Preto, University of São Paulo, Brazil**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**