Reviewer's report

Title: Fetal cardiotocography before and after moderate physical activity with water aerobics during pregnancy

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Reviewer: Linda E May

Reviewer's report:

1. Major Compulsory Revisions

   a. abstract/title/manuscript- need to be specific on whether this is relating to acute aerobic activity or multiple sessions. The description in methods and a mention in the discussion does not make this inherently clear.
   
   b. water aerobic session intensity- pg 5 last paragraph describes that moderate intensity exercise . . . should be adapted to 60-90% of . . . heart rate” so was this criteria used or not?? How was this moderate intensity determined?
   
   c. there have been studies looking at FHR responses to maternal water exercise. There have also been studies noting the effect of fetal body movements to exercise as well as fetal HR accelerations (not water exercise, but exercise). So what is the significance of doing this study in the water? And with these measures? How will this data help pregnant women and/or their health care providers??
   
   d. any idea whether women were taking any medications, smoking, using alcohol? If so, this should be mentioned and really should be part of screening.
   
   e. Was the time of day the sessions occurred, time after last meal, maternal hydration status controlled? All of these may influence results, so if they were not controlled for then this needs to be addressed in the limitations section.
   
   f. Really need to address fetal activity state. The fetal heart rate and movements will vary based on whether the fetus is in a quiet or active state. Without separating FHR and fetal movement data by activity state it is like comparing exercisers (resting and exercise test HRs pooled) to control adult (resting and exercise test HRs pooled) for HR differences. You will likely not find HR differences and have large standard deviations! This must be controlled for!!
   
   g. methods need to clearly state how fetal (body) movements were assessed, what the criterion were for FHR accelerations and decelerations and how variability was determined. There are various methods for each of these.
   
   h. Discussion: (bottom of pg 7) it is mentioned that an alteration in the FM/A ratio is an important finding, but this is never explained or discussed. Please talk about why this is important and what the finding means.
   
   i. Discussion: (top of pg 8) mentions no significant differences between pre- and post- exercise evaluations of FM/A data, but look at graph 2. That is an interesting trend, talk about what happens at the 28-31 wk interval that may be
affecting fetal movements and accelerations (ie. innervations).

2. Minor Essential Revisions

a. please specify in abstract and manuscript body movements, since movements in the fetus could be referring to breathing movements.

b. abstract (pg 2) conclusion sentence: “which (not what) suggests there are no adverse effects on the fetus.”

c. methods (pg 4): sample size calculation was a difference of 6 bpm or 4 bpm used?

d. pg 5 last sentence mentions the women were monitored for 20 minutes prior to water aerobics session, does this mean literally 20 minutes prior to aerobic part of session hence including the warm-up and stretching or 20 minutes prior to the entire session?? Not clear.

e. graphs in Figure 1 look nice- Big SDs should be cleared up by controlling for fetal activity state.

f. Table 3: should include % accelerations (to make it parallel with % decelerations) and also have % altered FM/A ratios. This might look better in figure form?

g. top paragraph of Pg. 7: refer to “the mean period of 20 minutes” not sure what this is referring to, what is mean period? And is this before or after exercise?

h. page 8 (center paragraph): clean up grammar a little and distinguish this is about fetal body movements and not breathing movements. Not sure what the last sentence is expressing.

i. pg. 8 states “it was not possible to confirm trend statistically, since the sample size of women varied between each gestational age group” and this is not true. Stats can still be run to compare these groups and that is worthwhile information.

j. pg 9 (middle of page) “The association between fetal movements and accelerations in FHR has yet to be better studied.” It has been studied previously by DiPietro et al (2008 and others) and I believe Hasegawa et al 1988. So maybe the authors mean specifically in relationship to the water exercise??

k. pg. 9 (bottom of page): in relation to decelerations in FHR not being of pathological significance this is true and some of this can probably be explained by the fetus’ activity state.

3. Discretionary Revisions

a. change the title so that it is more succinct, such as “Fetal cardiotocography before and after water aerobics”

b. other studies have utilized different gestational age categories, such as DiPietro’s studies, an akselrod study, May et al study). May want to consider explaining why these gestational age groups were used.

c. Figure 2: Alteration in FM/A ratio (%) looks good. It represents the data well,
but it was not mentioned in the Results section. Please mention this and keep it in the manuscript.

d. may want to mention Kwee et al. 2000 in discussion

e. may want to mention Bell, O’Neill 1994 in discussion

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.