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Lower cost of transport coincides with self-selected walking speed in pregnant individuals

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INTRODUCTION

Pregnancy has important structural and physiological changes related to the growth of the baby [1]. These changes can alter metabolic and biomechanical parameters of pregnant individuals (PI) [2]. Changes in the body centre of mass (CM), body dimensions, and weight can influence postural aspects as well as gait [3]. Thus, changes may occur in different variables such as cost of transport (C $J.kg^{-1}.m^{-1}$) [4], ventilatory efficiency evaluated by the ventilatory equivalent for carbon dioxide (VE/VCO_2), and walking speed. Aim: to compare C, VE/VCO_2, self-selected walking speed (SSWS) on treadmill and on a track, at different walking speeds, of PI and a control group (CG).

METHODS

PI: n=24 (n=8 in 1st trimester (T1), 12-13 wks; n=8 in 2nd trim. (T2), 26-27 wks; n=8 in 3rd trim. (T3), 35-36 wks); CG: n=8 healthy non-PI. VO_2 uptake was collected during trials of 5 min at 5 walking speeds, in randomized order (SSWS, ±40%, ±20% of SSWS) on the treadmill [5]. The SSWS was initially assessed on a track, and then tested on the treadmill. ANOVA for repeated measures was used to compare C and VE/VCO_2 for walking speed and groups. One-way ANOVA was used to compare SSWS on the track and on the treadmill. Multiple comparisons were possibly made with Tukey's post-hoc analysis (α=0.05).

RESULTS

Values of C were higher in PI compared to CG for all T ($p=0.005$; differences between trimesters $p=0.001$). VE/VCO_2 also showed higher values for PI (among T $p<0.0001$) compared to CG ($p<0.0001$). Differences in the SSWS (T1 0.83±0.14; T2 0.82±0.18; T3 0.85±0.18; CG 1.01±0.14 $m.s^{-1}$) on the treadmill and on the track were found for all T ($p<0.0001$), and between PI and CG ($p<0.0001$).

CONCLUSION

C always showed the characteristics of "U" shape described previously [4], with higher metabolic economy at SSWS. Interestingly, VE/VCO_2 showed higher values in T2 compared to T1, T3 and CG. VE/VCO_2 is known to be affected by increased chemoreceptor numbers, peripheral ergoreceptor response, dead space ventilation, and muscle mass involved in exercise [2]. The feeling of greater respiratory difficulty with the increase in walking speed and due to the smaller excursion of the diaphragm by the increased abdominal volume. Our results showed that the greatest respiratory comfort (lower VE/VCO_2) occurred at the highest speed performed (above SSWS). The choice of SSWS seems to be related to a greater metabolic economy and not to respiratory comfort.

After all physiological changes in T1 and T2 of pregnancy [1], T3 resulted to a certain adaptation. Lower metabolic economy is probably due to the physical alterations such as increase in body mass, displacement of the CM which could have altered the pendulum mechanism, generating displacement with less mechanical efficiency [5].

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