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ΠΑΡΑΡΤΗΜΑ 16

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Respiratory consequences of N95-type Mask usage in pregnant healthcare workers-a controlled clinical study

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Erratum in

Erratum to: Respiratory consequences of N95-type Mask usage in pregnant healthcare workers-a controlled clinical study.
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Abstract

Background: Outbreaks of emerging infectious diseases have led to guidelines recommending the routine use of N95 respirators for healthcare workers, many of whom are women of childbearing age. The respiratory effects of prolonged respirator use on pregnant women are unclear although there has been no definite evidence of harm from past use.

Methods: We conducted a two-phase controlled clinical study on healthy pregnant women between 27 to 32 weeks gestation. In phase I, energy expenditure corresponding to the workload of routine nursing tasks was determined. In phase II, pulmonary function of 20 subjects was measured whilst at rest and exercising to the predetermined workload while breathing ambient air first, then breathing through N95-mask materials.

Results: Exercising at 3 MET while breathing through N95-mask materials reduced mean tidal volume (TV) by 23.0 % (95 % CI -33.5 % to -10.5 %, $p < 0.001$) and lowered minute ventilation (VE) by 25.8 % (95 % CI -34.2 % to -15.8 %, $p < 0.001$), with no significant change in breathing frequency compared to breathing ambient air. Volumes of oxygen consumption (VO2) and carbon dioxide expired (VCO2) were also significantly reduced; VO2 by 13.8 % (95 % CI -24.2 % to -3 %, $p = 0.013$) and VCO2 by 17.7 %, (95 % CI -28.1 % to -8.6 %, $p = 0.001$). Although no changes in the inspired oxygen and carbon dioxide concentrations were demonstrated, breathing through N95-mask materials during low intensity work (3 MET) reduced expired oxygen concentration by 3.2 % (95 % CI: -4.1 % to -2.2 %, p <

0.001), and increased expired carbon dioxide by 8.9 % (95 % CI: 6.9 % to 13.1 %; p <0.001) suggesting an increase in metabolism. There were however no changes in the maternal and fetal heart rates, finger-tip capillary lactate levels and oxygen saturation and rating of perceived exertion at the work intensity investigated.

Conclusions: Breathing through N95 mask materials have been shown to impede gaseous exchange and impose an additional workload on the metabolic system of pregnant healthcare workers, and this needs to be taken into consideration in guidelines for respirator use. The benefits of using N95 mask to prevent serious emerging infectious diseases should be weighed against potential respiratory consequences associated with extended N95 respirator usage.

Trial registration: The study was registered at clinicaltrials.gov, identifier NCT00265926.

Keywords: Controlled trial; Healthcare workers; Infection control; N95 respirators; Pregnant women; Respiratory parameters.

Figures

Fig. 1 Determination of average work intensity...

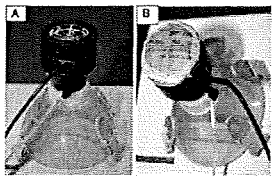

Fig. 2 Tight fitting Hans Rudolph respirator...

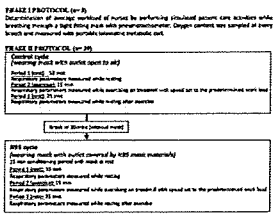

Fig. 3 Phase I & 2 Protocols

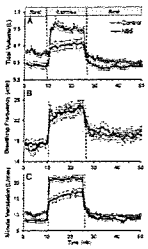

Fig. 4 Ventilation functions in pregnancy during...

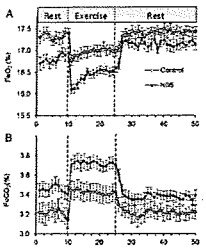

Fig. 5 Oxygen and Carbon dioxide content...

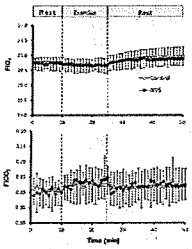

Fig. 6 Oxygen and Carbon dioxide content...

All figures (7)

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