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Effect of Selenium Supplementation on Thyroid Function in UK Pregnant Women: a Randomised, Controlled Pilot Trial

J. Mao[1,2], S. C. Bath[1], V. J. M. Pop[3], H. L. Vader[4], C. W. G. Redman[5] and M. P. Rayman[1]
[1]*Faculty of Health and Medical Sciences, University of Surrey, Guildford, GU2 7XH,* [2]*The First Hospital of China Medical University, China,* [3]*Tilburg University, Tilburg, The Netherlands,* [4]*University of Technology, Eindhoven, The Netherlands and* [5]*John Radcliffe Hospital, University of Oxford, Oxford OX3 9DU*

Selenium (Se) is an essential trace mineral which is important for human health including immune and thyroid functions(1). The thyroid has the highest Se concentration of all tissues and maternal thyroid function directly influences fetal development(2). This study explores the effect of Se supplementation on thyroid function in UK pregnant women.

At 12 wks' gestation, 230 pregnant women were randomized to 60 µg/day Se (high-Se yeast) or a yeast placebo in the SPRINT trial (Se in Pregnancy Intervention), and remained on treatment until the end of pregnancy. Whole-blood Se was determined at 12 and 35 wks by ICP-MS. Plasma selenoprotein P (SEPP1), an indicator of Se status(3), was measured at 35 wks by ELISA. Thyroid-stimulating hormone (TSH), free thyroxine (FT4) and antithyroid peroxidise antibodies (TPOAb) were measured at 12, 20 and 35 wks by immunoassay.

Whole-blood Se concentration did not differ between Se and placebo groups at baseline. At 35 wks, both whole-blood Se and plasma SEPP1 concentrations were significantly higher in the Se group than in the placebo group (both, $P<0.000$). Plasma SEPP1concentration at 35 wks was positively correlated with whole-blood Se (Spearman's $r = 0.776$, $P = 0.000$) in the whole population reflecting the fact that even in many of the women allocated to Se treatment, SEPP1did not reach a plateau (see Fig. 1). Hence the combination of Se dose and treatment time did not achieve nutritional Se sufficiency, as measured by plasma SEPP1(3).

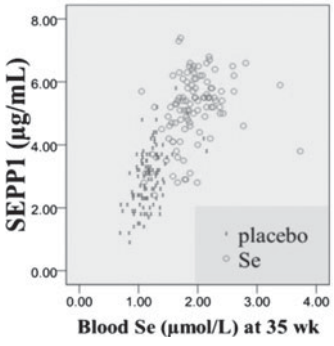

Fig. 1. SEPP1*vs.* whole-blood Se concentration at 35 wk.

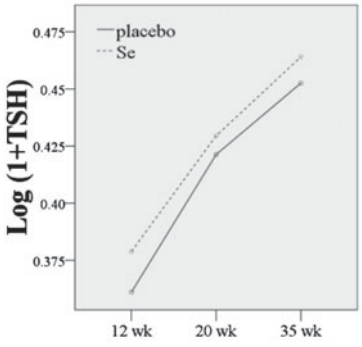

Fig. 2. TSH [as log (1 + TSH)] at 12, 20 and 35 wks gestation in TPOAb-ve women, by treatment group.

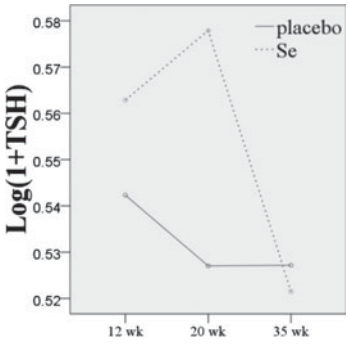

Fig. 3. TSH [as log (1 + TSH)] at 20 and 35 wks gestation in TPOAb + ve women, by treatment group.

We explored the effect of Se supplementation on TPOAb titre on which Se has been shown to have a beneficial effect(4). In women with TPOAb >35 IU/ml (TPOAb + ve), the titre significantly decreased in Se and placebo groups but with no difference between groups perhaps because the development of immunological tolerance during pregnancy masked any additional effect of Se.

TSH increased throughout pregnancy in both groups of TPOAb-ve women (Fig. 2) and decreased in the TPOAb + ve women, with an almost three-fold greater decrease in the Se treatment group than in the placebo group though the difference did not reach significance, probably because of the small number of subjects (Fig. 3).

There was a correlation between plasma SEPP1 and TSH at 35wks in the placebo group ($r = 0.206$, $p = 0.031$) and with FT4 at 35 wks in the Se group ($r = 0.251$, $p = 0.01$) suggesting that Se may regulate thyroid function differently depending on Se status.

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