



ORIGINAL RESEARCH – QUANTITATIVE

The association between third trimester multivitamin/mineral supplements and gestational length in uncomplicated pregnancies



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ABSTRACT

Background: Widespread use of maternal micronutrient supplements have been correlated to gestational length and outcome in women predisposed to pre-eclampsia and preterm birth. However, research is yet to be conducted examining the influence of micronutrient supplements on outcomes at term in uncomplicated pregnancies.

Aim: To analyse the relationship between third trimester micronutrient supplementation and gestation length at birth, demographics and maternal birthing outcomes in well women at term in a South East Queensland representative population.

Methods: This research retrospectively analysed existing data pertaining to 427 uncomplicated, pregnancies birthing at the Gold Coast and Logan Hospitals using information gathered through the Environments for Healthy Living Study and Queensland perinatal data collection. Data were analysed using SPSS v20 by Chi square, ANOVA and regression analysis.

Findings: Women in the third trimester taking individual zinc, folic acid or iron supplements in combination with a multivitamin were twice as likely to birth beyond 41 completed weeks (AOR 2.054, 95% CI 1.310–7.383, $p = 0.038$) then those who did not take any supplement when controlled for established confounders. Non supplement users were found to experience a lower rate of post dates labour and requirements for induction (AOR 0.483, 95% CI 0.278–0.840, $p = 0.01$).

Conclusion: Length of gestation demonstrates significant associations with micronutrient supplementation practices. Well women consuming third trimester individual micronutrient supplements in addition to multivitamins experienced a longer gestation at term compared to women taking no micronutrients, increasing their risk for postdates induction of labour.

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1. Introduction

Post-dates gestation and prolonged pregnancy pose an increased risk to both mother and baby, routinely managed through induction of labour in the post-dates period.¹ While the mechanisms responsible for parturition have yet to be fully elucidated, maternal nutritive status has been identified as contributing to its onset and progression,² with suboptimal nutrition largely associated with poor perinatal outcomes.³

The importance of adequate maternal micronutrition in facilitating healthy foetal development and supporting the increased demands of pregnancy on maternal physiology has prompted increasing proportions of women to choose a multivitamin preparation during pregnancy.^{2,3} Multivitamin and mineral supplementation has been found to reduce pregnancy complications, such as pre-eclampsia and preterm birth, when utilised in the first trimester.^{2,4} However, there is a lack of similar research regarding the physiology of term and post-dates gestation and effect of third trimester micronutrient supplements on the length of gestation at term and beyond.

This research retrospectively examined the relationship between micronutrient supplementation in the third trimester, length of gestation and birthing outcomes in an Australian cohort from South East Queensland, providing a valuable foundation for

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ongoing research to improve antenatal nutrition counselling and birthing outcomes in well women at term (Fig. 1).

2. Literature review

Human parturition is defined as normal if its onset, coordination and progress occur within a set of defined parameters.⁵ Any birth occurring between 40 and 42 weeks is deemed post-dates, with pregnancy continuing beyond 42 weeks considered prolonged.⁶ Risk to both mother and baby commonly associated with such gestations is routinely managed through induction of labour in the post-dates period.¹

The labour initiation process is physiologically dependent on uterine change from a quiescent to a contractile state. Hormonal, mechanical and inflammatory influences are known to contribute to this change, as is maternal nutritive state.^{7,8} Deficiencies in several key micronutrients have been linked with inflammatory processes associated with preterm labour and pre-eclampsia.⁹

While the effects of malnutrition on pregnancy outcome has been well documented in the developing world, suboptimal nutrition remains a significant public health issue in the developed world, with up to 3 billion people considered malnourished as a result of undernourishment, and micronutrient deficiencies in the presence and absence of adequate macronutrition.¹⁰ A large systematic review recently reported that the Australian population is subject to a number of micronutrient deficiencies, with intakes of thiamine, vitamin A, folate, vitamin D, calcium, iron, magnesium and zinc below the estimated average requirement in Australian women.¹¹ Supplementation of micronutrients such as folate, B group vitamins, selenium, vitamin C, vitamin E, zinc and β -carotene have demonstrated improvements in immune function and a reduction in inflammation and placental oxidative stress, and maybe important in improving perinatal outcomes in both high risk pregnancies, especially those in the developing world.⁹

Despite this work, population level research is limited regarding the effects of micronutrient supplementation on maternal outcomes at term. While maternal and infant nutrition in the developed world demonstrates vastly superior outcomes with regard to perinatal morbidity and mortality, most fail to meet

World Health Organisation recommendations regarding intervention at term.¹² This is reflected in the Australian perinatal data statistics, with the national labour induction rate remaining at 25% over the last decade, of which 25% were undertaken for management of prolonged pregnancy.¹³ This equates to 3530 post-dates inductions in 2012 in Queensland alone.¹³

Considering that primary health care providers are a major source of information regarding healthy eating during pregnancy,¹⁴ it is interesting to note that women report the information they receive to be both inconsistent and contradictory.¹⁵ Given that appropriate nutrition education and support has the capacity to improve maternal birth outcomes,¹⁶ it is essential that primary carers have an understanding of the potential implications of suboptimal nutrition counselling and micronutrient intake during the third trimester of pregnancy.

3. Participants and methods

The Environments for Healthy Living (EFHL) is a prospective longitudinal study conducted by Griffith University across the Logan, Beaudesert, Gold Coast Health Districts in South East Queensland (QLD) and Tweed Heads in northern New South Wales (NSW), Australia.¹⁷ EFHL is registered with the Australian and New Zealand Clinical Trials Registry (ACTRN12610000931077) with detailed methodologies previously published.¹⁷ The EFHL study was approved by the Griffith University Human Ethics Committee (MED/16/06/HREC, MED/23/11/HREC). Additional ethical approval was obtained from each recruiting hospital (Logan HREC/06QPAH/96, Gold Coast Hospital HREC/06/GCH/52). All women included in this cohort gave written consent for the release of their perinatal data from hospital collections.

The target population for this research was pregnant women in the South East Queensland region. From November 2006 – October 2011, a total 2619 live births were recorded from mothers recruited to the EFHL study in the QLD sites; this equated to 23.4% of total births in the target population hospitals during the recruitment periods.

Data were collected from the maternal baseline survey and hospital perinatal data records for the Logan and Gold Coast

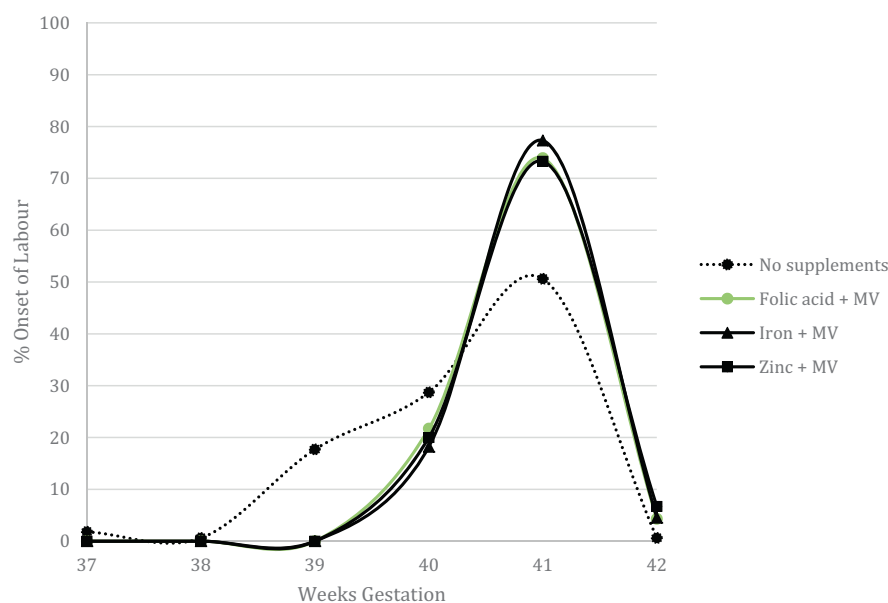


Fig. 1. Effect of micronutrient supplementation on gestational length of well women at term in completed weeks.

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