

# Multi-micronutrient supplementation for infant growth and development, and the contributing role of psychosocial care dissertation

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## Abstrak

### ABSTRAK

It is well known that iron and zinc deficiencies have negative consequences on growth and development; therefore combined iron and zinc supplementation has been proposed to be applied at community level. However, studies on zinc supplementation and infant's growth have shown inconsistent results. While physiological factors may partly explain the variation in findings, contribution of care specifically psychosocial care to the outcomes has been less discussed.

This study aims to investigate whether effect of micronutrient (zinc, iron, vitamin A) supplementation in improving infants' growth and developmental outcomes is modified by levels of psychosocial care. The main hypothesis of the study is that zinc and iron supplementation improves growth and developmental outcomes of the infants and that the effect is improved with more favorable psychosocial care.

The study involved 800 infants aged 3-6 months living in the rural area of East Lombok, West Nusa Tenggara. The main study was a double-blind community intervention study where syrup -consisting of zinc alone, Z (10 mg/d), zinc+iron, ZF (10 mg of each/day), zinc+ iron+ vitamin-A, ZFA (10 mg/d for each zinc and iron, 1,000 IU for vitamin-A), or placebo-- were given in daily dose for six months. The measured outcomes were growth, index on mental (MDI) and psychomotor (PDI) development using Bayley Scale of Infant Development II (BSID II), and micronutrient status (hemoglobin, serum zinc, ferritin, and retinol). Psychosocial care was assessed using Home Observation for Measurement of the Environment (HOME) Inventory scale. Other data included morbidity, food intake, childcare practices, resources for care, and socio-economic condition.

Significant effect on serum zinc was observed in Z, ZF and ZFA groups and on serum retinol in ZFA group ( $p<0.05$ ). Prevalence of anemia and low iron storage (ferritin  $<10 \mu\text{g/L}$ ) remained the same in ZF and ZFA groups while increased ( $p<0.01$  for hemoglobin,  $p<0.05$  for ferritin) in Z and placebo groups. In general there was no significant effect of the supplementation on growth (HAZ, WHZ, WAZ). However, positive response on linear growth (HAZ) was observed among initially stunted infants, especially stunted boys who receive both zinc and iron (ZF and ZFA groups,  $p<0.05$ ). There was an improvement of mental development

in all groups, but only significantly in ZF group ( $p<0.05$ ). In addition, subjects whose anemia remained uncorrected had significantly lower mental scores than those who were not/ no longer anemic ( $p<0.05$ ).

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Better psychosocial care was associated with better growth, and the difference in growth among upper and lower levels of psychosocial care is minimal in the infants who received iron-zinc supplementation, suggesting that both supplementation and psychosocial care had an effect on growth. However, during the six-month supplementation, combination of both supplementation and better psychosocial care was not more significant than interaction of iron-zinc supplement and male sex (for HAZ) or levels of psychosocial care alone (for WAZ). Growth is determined not only by micronutrient intake and status but also by the contributing role of psychosocial care. Psychosocial care affected growth indirectly through better nutrient intake and health practices, and possibly through direct mechanism, which was not yet identified.

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The effect of zinc+ iron supplementation on mental development was stronger when combined with better psychosocial care and higher hemoglobin level. Accelerated mental performance was also observed in placebo, suggesting that factor(s) other than nutritional factor(s) may influence mental performance. On the other hand, psychomotor outcome was more predicted by nutritional status (WAZ), age, nutrient intake and illness.

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Results from this study concluded that mental development was determined both by micronutrient status and psychosocial care. Psychosocial care affected mental development partly through better initial mental performance, but mainly direct suggesting that environmental factor(s) had a stronger role than initial status in determining mental performance.

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Six months after the supplement was no longer given, growth (HAZ, WAZ, WHZ) remained better in infants having better psychosocial care. The association between growth (HAZ, WAZ) and HOME score at six months after the end of supplementation became stronger than during the intervention period, whereas positive benefit of the supplementation on -HAZ among boys -as observed by the end of the 6-month supplementation- was no longer maintained at this point of time. During the six-month supplementation, the subsequent six months, and over the total 12-month period, nutrient intake together with illness and psychosocial care were significant determinants of nutritional status (HAZ and WAZ).

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Results of this study suggest that incorporating care elements including encouragement of psychosocial care

in supplementation/nutritional programs should improve its effectiveness and sustainability. The study also recommends further study to investigate more optimal iron: zinc ratio (probably more than 1:1) when given to anemic, iron deficient subjects and to investigate the mechanism connecting psychosocial care and nutrition/ health outcomes.

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