



# **Improved Breast Feeding Retention Rates Associated With Postnatal Maternal Oral Zinc Supplementation**

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## Tallangatta Study

The Tallangatta district covers an area of 4000 sq kms in North Eastern Victoria. The Maternal and Child Health Service is based at Tallangatta which, with a population of 1000, is the largest town.

There have been no significant population or socio-economic changes in the district over recent years. The birthrate is usually between forty and fifty annually.

Tallangatta Maternal and Child Health Centre is open two days a week and twice-monthly clinics are held at Mitta Mitta, Walwa and Bellbridge. Mitta Mitta is the most isolated in regard to health services with a Medical Practitioner visiting for three hours once a month. All obstetric services are based at Wodonga or Albury, which involves a return trip of up to 240 kms for some families.

Access to health and welfare support services such as a hospital post natal unit, child care and home help is impractical or unavailable. The women, if help from family and friends is not possible, have to cope the best they can with their increased workloads.

New mothers and their infants may experience many difficulties in the postnatal period as evidenced by the amount of literature both in professional journals and in the popular press. The establishment of breast feeding is commonly associated with problems such as an inadequate supply, and sore, cracked or blistered nipples.

At Tallangatta in 1989 it became increasingly apparent and was of great concern that many women were not succeeding in establishing breast feeding. Tiredness, increasing work loads relating to the care of family (and farm), unavailability of home help and appropriate child care, lack of sleep, short term memory lapses, inability to communicate needs, appetite aberrations, loss of self-esteem and lack of confidence were all problems with which these mothers had to cope.

It was noticeable that a significant number of mothers were having multiple problems with both their own and their infant's health and well-being, particularly during the first three months postnatally. Although these symptoms were professionally of great concern many women considered them 'normal' and just something they had to endure. Generally the mothers blamed 'infant colic' as the cause of most distress to the infant, herself and the family.

When studying the occurrence of these problems it became apparent that there was significant 'clustering' of symptoms experienced in both the mother and infant. Mothers who had multiple symptoms postnatally had infants who presented with skin rashes, thrush, respiratory tract infections and gastric reflux in addition to persistent crying or 'infant colic'.

Traditionally in the wider community 'infant colic' is considered a common problem in the first three months of life, and is generally associated with 'something the breast feeding mother has eaten'. This implies irresponsibility, and lack of care by the mother, adding to her distress.

A precise definition of 'infant colic' is elusive. Professional opinions vary as to its cause and management. It is seen as a 'normal' developmental process<sup>1</sup> or is 'a complex transaction between the infant and his (sic) environment with multiple factors responsible'<sup>2</sup> or 'the first psychosomatic disorder'<sup>3</sup>. Medical intervention is now generally not indicated except in some cases where, in protracted 'infant colic', a kidney infection may be implicated<sup>4</sup>.

Techniques such as application of warmth, infant massage, and movement which can be demonstrated by Maternal and Child Health nurses are considered appropriate management by medical practitioners. Lack of facilities, time and distance involved in this district often preclude the use of these techniques. However severely restricted the access to services is, the support of extended home visiting and practical help and advice by the nurse is desirable. It is considered that the most practical approach in this rural district is to ensure that these postnatal women are in optimal health.

## Nutrition And Zinc

Although the postnatal women at Tallangatta appeared to be well nourished, and were generally eating a balanced diet, it was decided to review their nutritional requirements. Dietary guidelines published by the National Health and Medical Research Council state that pregnant and lactating women need additional iron, folate and zinc<sup>5</sup>. The Recommended Dietary Intakes in Australia state that zinc be increased by 4 mg daily during pregnancy, and by 6 mg daily during lactation, from the 12 mg recommended daily for the general adult population. Iron and folate supplements are frequently prescribed, but a zinc supplement is not. Many of the post natal symptoms of these Tallangatta mothers such as lethargy, skin rashes, memory lapses, and irritability are also symptoms which may be associated with that of a zinc deficiency.

As none of the Tallangatta mothers were taking or had taken a zinc supplement either during pregnancy or postnatally, it was considered possible that these women were zinc-deficient.

Following further research of the literature it was suggested to the women that they may possibly be zinc-deficient and that the taking of a zinc supplement may be beneficial to their health and well-being. An improvement in their health may help them cope with the increased workload and establish and continue breast feeding for a longer period.

## Zinc Supplementation And Apparent Benefits

Initially seven mothers who were fully breast feeding on discharge commenced taking, during the second postnatal week, zinc complex 15 mg (orally), daily before or with lunch. After two weeks of supplementation all mothers noticed a reduction in the incidence and severity of 'infant colic' but most significant was their own improved energy levels, and coping skills. An interesting observation was that many problems often associated with the establishment of breast feeding did not eventuate.

In view of the benefits observed, the information relating to zinc deficiency and supplementation was then given to all new mothers attending Maternal and Child Health Centres in the district whether or not they were breast feeding. This has now become standard practice. The decision whether or not to take the zinc supplement is always the mother's choice. The acceptance and enthusiasm by the women taking the zinc supplement has been overwhelming.

In the ensuing five years, many of these women have conducted their own 'trials' and have observed and reported the results both verbally and in writing. The beneficial response of the supplementation in many cases was within 24 to 48 hours. These observations noted rapid healing of cracked nipples and oral thrush in the infant when they had not responded to other treatment; mothers not as irritable or bad tempered (partners' observation!) and improvement in mothers' appetites and sleeping patterns. It was also observed that infants of the supplemented mothers were generally more content, did not suffer from skin rashes, and were gaining weight satisfactorily. The most frequent observation by the women was that they were no longer tired.

Women who had no contact with each other were reporting the same changes such as 'more energy' and 'getting up at night to feed does not make me tired the next day' and that they were able to cope with the demands of their new infant while continuing with their normal workloads. Their lack of tiredness was the most significant factor in their ability to successfully establish and continue breast feeding.

One mother writes:

*As a mother of 3 boys under the age of 5 I can well appreciate the advantages of using zinc. My first baby, whom I did not take zinc for, was colic (severe) from 6 weeks to 12 weeks. I then used zinc with the next two boys & never looked back. When taking zinc it is hard to appreciate what it is really doing, but have a child without it & you sure can appreciate its value!*

And from another mother:

*I am the mother of 3 young busy children as well as a daycare caregiver.*

*I was introduced to the Zinc Tablets very soon after the birth of my 3rd child. My early experience with the Zinc after the baby was just amazing, I was before this, extremely tired and exhausted with some help from Home Help, although the birth was absolutely normal.*

*After a few weeks I took the Zinc Tablets, and after a very short time I was organised in the home, I was able to cope with the washing, housework, meal times and feeding of the new born, without needing any extra help from*

*outside. With Christmas coming on I was emotionally as well as physically strong enough to cope with all the added pressures for that time of year.*

*After the birth of the first two children I wasn't near as exhausted, depressed and lifeless as this change after the 3rd I couldn't believe the difference.*

*I believe that if I wasn't introduced to the Zinc there would have been no way that I could have taken on any extra commitments both inside and outside the home. I still at different times take this miracle for those extra emotional and physical moments.*

## Tallangatta Breast Feeding Statistics

Breast feeding information in Victoria is recorded by the Maternal and Child Health nurse on the Infant Record Card. As 96 per cent of all infants born in Victoria are enrolled these statistics give an accurate assessment of breast feeding throughout the State<sup>6</sup>. Breast feeding status on enrolment, at three months and again at six months and the age of infant at the time of weaning is recorded. The reason for weaning is generally noted by the nurse, but this is not included in the breast feeding statistics compiled by Health and Community Services.

Statistics are obtained from the Infant Record during the infant's second year ie the Victorian breast feeding information relates to those infants born the previous year. At Tallangatta the number of infants breast fed on enrolment decreased from 89 per cent in 1989/90 to 82 per cent in 1993/4. It is therefore considered significant that the retention rate during this time increased from 79 per cent in 1990/91 to 91 per cent in 1993/4 at three months, and at six months from 64 per cent to 74 per cent respectively. Of all infants enrolled at Tallangatta in 1990/91, 64 per cent were fully breast fed at three months and 52 per cent at six months. This rate had increased in 1993/4 to 74 per cent and 61 per cent respectively. The general acceptance by the women to take the zinc supplement in the first three months after the birth of their infant has been the only change of management , help or advice which has been implemented.

With the continuing enthusiasm by the mothers concerned and their desire to help other women, it was necessary to undertake research relating to zinc deficiency and zinc supplementation in the postnatal period. Presentation of this study<sup>7,8</sup> further research which is currently being analysed, and an extensive literature review relating to zinc and zinc deficiency has endorsed many of the observations made in the clinical setting and those of the women themselves.

## The Environment, Zinc And Zinc Deficiency

All life is dependent on the environment. All plant and animal health is dependent on the nutritive value of the food source. Nutrition, growth and development of plants and animals are also dependent on the ability to uptake required nutrients available from their surrounding environment and utilise them effectively. This ability varies greatly between individual organisms.

Soil zinc deficiency is estimated to affect 30 per cent of agricultural land world wide<sup>9</sup>. Weather patterns, the use of superphosphate<sup>10,11</sup> irrigation, cultivation, polythene and copper pipes can all affect soil and water zinc levels. High copper intake can occur if drinking water is stored in a copper lined urn or when leached from domestic water pipes. Atmospheric lead from the burning of fossil fuels is a continuing environmental and health problem.

Humans require zinc for all cellular function<sup>12</sup>. It is essential for enzyme production and metabolism including growth, carbon dioxide excretion, sexual development, alcohol detoxification, energy and amino acid metabolism<sup>13</sup>. Zinc in the diet is most commonly obtained from meat, legumes and whole grains, fish and shellfish. In the USA zinc deficiency was observed in children whose intake of meat was less than 30 gm/day<sup>12</sup>.

A number of other elements such as copper, lead and cadmium affect the absorption and use of zinc by the body. Food processing for human consumption can also alter the composition and balance of nutrients. The processing of wheat which contains both zinc and cadmium can depress the zinc content. Cadmium and lead are both toxic elements which are absorbed by the body and retained.

Cadmium, lead and copper compete with zinc for binding sites in the body. Prasad et al<sup>14</sup> propose that zinc supplementation be used to lower human blood lead levels. A high fibre diet, soya products, unleavened bread, the use of the contraceptive pill, high caffeine and alcohol intake, prescription and non-prescription drugs<sup>15</sup>, exposure to cigarette smoke<sup>16</sup>, and iron supplementation<sup>17,18</sup>, may all be causative factors of low zinc levels. Iron supplementation in pregnancy, if not necessary, may actually be harmful<sup>19</sup>. Increased cadmium levels in women who smoke can lower zinc levels in the cord vein red blood cells and is associated with low birth weight<sup>20</sup>.

Symptoms of deficiency are many and varied. Lethargy, moodiness, irritability, mental depression<sup>21</sup>, memory problems, appetite aberrations<sup>10</sup>, skin rashes, delayed wound healing, susceptibility to infection<sup>10,22</sup> reproduction and growth problems<sup>23</sup> may all be linked to a deficiency. Increased urinary excretion of zinc occurs in periods of stress and in conditions such as diabetes, alcoholism<sup>24,25</sup> and foetal alcohol syndrome where urinary output is increased. Obese people may also be 'deficient in zinc and magnesium which are essential for normal immune performance'<sup>26</sup>.

Improvement in immune responses has been observed following zinc supplementation in the elderly<sup>21,27</sup>. Low maternal zinc levels in the third trimester have been associated with infants of low birth weight<sup>28</sup>, and Simmer et al<sup>29</sup> report reduced incidence of intra-uterine growth retardation following supplementation during pregnancy to women at risk.

## Assessment Of Zinc Status

Estimation of human zinc levels is difficult as no biochemical tests for accurate assessment have yet been developed<sup>30</sup>. Plasma zinc is commonly used, however it is not considered by some researchers to be an accurate indicator of zinc status<sup>31,32</sup>. Mahomed<sup>33</sup>, Barnet<sup>21</sup>, and Duchateau<sup>27</sup> believe leucocyte zinc is a more accurate indicator while other researchers still question the accuracy of this test. Sweat and hair levels are not a reliable or generally a practical method of measurement of marginal zinc deficiency<sup>32</sup>. Bryce-Smith has developed and validated a 'taste test'<sup>34</sup> to assess levels of zinc deficiency and it is a convenient assessment of zinc status in the clinical setting.

Mild or marginal zinc deficiency may be more common than previously thought and pregnant and lactating women may be at risk<sup>14</sup>. Studies undertaken to assess the effect of both deficiency and supplementation during pregnancy are not consistent. This may be due to selection of population, methodology and biochemical analysis methods<sup>35</sup>. It is commonly perceived by many health professionals that Australians who consume a 'well balanced diet' will receive adequate nutrition for their health. The National Health and Medical Research Council of Australia state a minimum requirement of zinc for adults is 8-12 mg/day 'but that, even in instances of diets providing less than 6mg ----- improved zinc absorption and endogenous losses enable zinc requirements to be met'<sup>5</sup>. Zinc and magnesium levels in Australians are borderline<sup>36</sup> and in pregnant and lactating women likely to be deficient.

In a Dunedin (New Zealand) study<sup>37</sup>, prenatal dietary intakes of nutrients including zinc were found to be 'potentially inadequate' compared with recommended intakes for New Zealand and Australian pregnant women. Bryce-Smith<sup>34</sup> proposes routine zinc supplements during pregnancy but this is not supported by Hytten<sup>38</sup>.

The best indicator of mild zinc deficiency is to take the supplement and observe the results (Bryce-Smith, personal communication, 1993). If the symptoms improve they were due to a zinc deficiency<sup>10,30</sup>. Zinc is not retained in the body and there is a very wide safety margin with therapeutic doses of 120 mg daily being tolerated<sup>10</sup>.

## Zinc Levels And Breast Feeding

Dietary supplements are generally not prescribed in the postnatal period and women are advised that a good balanced diet 'will ensure that your extra energy and nutrient needs are met'<sup>39</sup>. Zinc levels in colostrum are higher than in breastmilk and continue to decrease throughout lactation. Premature infants are at risk therefore, if fed mature breast milk<sup>40</sup>.

Acquired zinc deficiency in the newborn is generally considered to be uncommon<sup>41</sup> as the bioavailability of human milk is high<sup>42</sup>. Breast milk levels do not appear to be affected by maternal dietary intake but in a study by Krebs<sup>43</sup> the rate of decline was less when a zinc supplement was given to the mothers.

## Breastfeeding Statistics

As mentioned previously breast feeding statistics are compiled by Health and Community Services Victoria. In 1943, 55 per cent of Victorian mothers were fully breast feeding at three months and 42 per cent at six months but for almost the next thirty years there was a steady decline in the percentage of mothers fully breast feeding their infants at these ages.

By 1971 the number of mothers breast feeding had decreased to 21 per cent and 9 per cent respectively<sup>44</sup>. A similar decline was recorded in other western countries such as the United States of America, the United Kingdom, Sweden and Denmark<sup>45</sup>. In the following 15 years, however, a dramatic increase in breast feeding rates occurred. This increase was also apparent in other western countries. No common causes for these similar patterns of breast feeding have been identified<sup>45</sup>. Since 1986 there has been no improvement in breast feeding rates of Victorian mothers. In 1992/3, 53 per cent were breastfeeding at three months and 39 per cent at six months.

In 1986/7 these figures were 53 per cent and 39 per cent respectively<sup>6</sup>. In the United States of America Ryan et al<sup>46</sup> reported an actual decline in breast feeding in the years 1984 to 1989. Although women are now generally well informed on the advantages and management techniques of breastfeeding, many women wean their infants within the first few weeks.

Research into postnatal issues including breast feeding is difficult as population studies involving interviews may be considered time consuming, invasive, and stressful at a time when the families are adjusting to the new infant. Some population groups are unrepresented, as in a post natal research project by Astbury et al<sup>47</sup>. In this study with a response rate of 71 per cent, single women and women from non-English speaking background were under-represented.

The most common reasons given for weaning are concerns of milk supply and nipple problems<sup>48</sup>. A study in Western Australia<sup>49</sup> identified insufficient milk (44 per cent), and sore nipples (35 per cent) as the most common cause of weaning. In a study by Nicholson<sup>50</sup> the failure of lactation was attributed to a multitude of problems and the mother's inability to cope with the distress of their infants. In another West Australian study<sup>51</sup> it was concluded that early weaning was associated with 'a body mass index above the normal range,' smoking, and maternal age.

Breast milk is recognised as the preferred food for infants at least until 6 months of age and studies have shown that there are many benefits to both the mother<sup>52</sup> and infant<sup>53,54</sup>. If breast milk was the primary food of Australian infants under 6 months the benefits would have a considerable impact on the health and well-being of Australian families<sup>55</sup>.

## Conclusions

The study of zinc deficiency in relation to postnatal health is complex. The extensive literature review has revealed many aspects of zinc deficiency particularly during the antenatal period. Although the multitude and variety of symptoms which are associated with a deficiency are also those commonly observed in the postnatal period, studies of zinc deficiency are still few.

These observations and a subsequent study<sup>7,8</sup> at Tallangatta have generally endorsed the positive benefits which were observed and reported by the women concerned. Zinc deficiency is easily rectified with a self administered supplementation which is non-toxic, inexpensive<sup>27</sup> and safe. To be of maximum benefit however, it must be given at the time of greatest need. Absorption is enhanced if the supplement is taken with orange juice.

It is suggested therefore that postnatal zinc supplementation commence as early as the first postnatal day as zinc levels are likely to be depleted following the stresses of labor and parturition. Supplementation should be considered as the 'first resort' in order to minimise or prevent the problems which are associated with postnatal maternal and infant health. The relationship between maternal well-being and successful and prolonged breastfeeding is significant. It is concluded that marginal zinc deficiency may be more common, particularly in postnatal women, than previously believed and be a crucial factor in their health status.

It is recommended that postnatal women be given the appropriate information, and the opportunity to commence an oral zinc supplement following the birth of their infant, if they wish to do so. The goal of 75 per cent of Australian infants breastfed at six months by the year 2000 may yet be achieved.

## Comments

Tallangatta demonstrates the value of community involvement in primary health care. The involvement, and enthusiasm of the women in the district and their determination that 'all women should know about the benefits of zinc supplementation' has been instrumental in the continuation of the program and continuing research. The women concerned have shown that it is possible to take an active role, not only in their own health, but also in the health of other women and their families.

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