

Diet and ADHD – Zinc Information Sheet

Zinc is an essential mineral that we must consume in our diet. It is needed for the brain, digestion and the immune system. Recently, there has also been some interest in the role that Zinc might play in ADHD. However, research in this area is still in the early stages. NHS Highland does not recommend Zinc supplements as a routine treatment for ADHD. However, it is worth ensuring that the diet contains adequate amounts of Zinc rich foods. This information sheet summarizes this research and its implications for children with ADHD.

Research studies on Zinc

- Average intakes of Zinc among UK schoolchildren are below the “Reference Nutrient Intake” (Gregory, 2000). This means that some children may be at risk of “Marginal Zinc deficiency”.
- Severe Zinc deficiency affects growth and is common in developing countries. However, marginal Zinc deficiency appears to affect brain function and has been found in middle class populations in developed countries (Hambridge, 2000), (Prasad, 1996).
- Moderate Zinc deficiency in rats causes impaired learned behaviour and impaired cell maturation (Takeda, 2000), (Yeiser, 2002).
- Zinc deficiency may be more common in children with ADHD than in children without ADHD (P Toren, 1996), (Starobrat-Hermelin, 1998), (Kozielec, 1994), (Bekaroglu, 1996), (Arnold, 2005). This could be due to low intake of Zinc rich foods, poor absorption or increased Zinc excretion (Arnold, 2005).
- One study of American children showed a strong correlation between Zinc status and the degree of inattention in ADHD. However, they found no correlation between Zinc status and impulsivity or hyperactivity (Arnold, 2005).
- Zinc supplements on their own have been shown to reduce ADHD symptoms of hyperactivity and impulsivity compared to placebo. However this has only been shown at relatively high doses that may not be safe in the long term (Bilici, 2004).
- Stimulant medication may work better in children with good Zinc status than in those who have a poor Zinc status (Arnold, 2000).
- Zinc supplements can improve the effectiveness of stimulant medication. The effect was seen in both the parent and teacher rating of ADHD symptoms in a “blinded placebo controlled” study (Akhondzadeh, 2004).
- Two studies show that some artificial food colours increase ADHD symptoms and reduce Zinc status in children with ADHD, leaving the zinc status and behaviour of children without ADHD unaffected (Ward, 1990), (Ward, 1997).

Possible mechanisms

Zinc plays a role in the structure and function of the brain. It is needed for the production of long chain fatty acids that are used in brain cell membranes. Zinc also has a powerful antioxidant role and therefore is needed for the stabilization of cell membranes (in the brain and elsewhere). Zinc activates vitamin B6 to the active form which enables serotonin production. Zinc is also required for the production and modulation of melatonin. Serotonin and melatonin are important “brain chemicals” that affect mood and sleep patterns.

Implications

- We **do not** recommend Zinc supplements as a single routine therapy for ADHD. At present, there is not enough scientific evidence in favour of this.
- There may be some value in taking Zinc supplements alongside stimulant medication for ADHD. However, this should only be done under the supervision of your paediatrician.
- We **do** recommend that children include **dietary sources** of Zinc as part of a healthy balanced diet. Zinc is found mostly in protein rich foods.
- **Very good sources of Zinc include beef (including mince) and lamb. Good sources of Zinc include pork, chicken, fish, shellfish, pumpkin seeds, chick peas, peas, beans, eggs, cheese, yoghurt and nuts.**
- As a “rule of thumb” children who eat 2 or 3 portions of red meat a week are more likely to have a good Zinc status than those who eat no red meat. Children who eat very few protein rich foods are quite likely to be deficient in Zinc. This could exacerbate any symptoms of ADHD.
- Note that red meat is also a particularly good source of Iron. Iron is also an important mineral for the brain. More information on Iron is available in a separate NHS Highland information sheet.
- Remember that many children with ADHD have a perfectly adequate diet and are not deficient in Zinc or any other nutrient.

Further information:

For further information, talk to your Community Paediatrician or to Children in the Highlands Information Point Plus (CHIP+) at the Birnie Child Development Centre, Raigmore Hospital, Inverness.

BIBLIOGRAPHY

Akhondzadeh S Zinc sulfate as an adjunct to methylphenidate for the treatment of attention deficit hyperactivity disorder in children: A double blind and randomized trial [Journal] // BMC Psychiatry. - 2004. - 9 : Vol. 4.

Arnold L E Does zinc moderate essential fatty acid and amphetamine treatment of attention deficit hyperactivity disorder [Journal] // Journal of child and adolescent psychopharmacology. - 2000. - 2 : Vol. 10. - pp. 111-117.

Arnold L E Serum Zinc correlates with parent- and teacher-rated inattention in children with attention-deficit/hyperactivity disorder [Journal] // Journal of child and adolescent psychopharmacology. - 2005. - 4 : Vol. 15. - pp. 628-636.

Bekaroglu M Relationship between serum free fatty acids and zinc and ADHD [Journal] // Journal of Child Psychology & Psychiatry. - 1996. - Vol. 37. - pp. 225-227.

Bilici M Double-blind, placebo controlled study of zinc sulfate in the treatment of attention deficit hyperactivity disorder [Journal] // Prog Neuro-Psychopharmacology and biological psychiatry. - 2004. - Vol. 28. - pp. 181-190.

Gregory The Diets of British Schoolchildren [Journal] // National diet and nutrition surveys. - London : HMSO, 2000.

Hambridge M Human Zinc deficiency [Journal] // Journal of Nutrition. - 2000. - Vol. 130. - pp. 1344-1349.

Kozielec T Deficiency of certain trace elements in children with hyperactivity [Journal] // Psychiatry Pol. - 1994. - Vol. 3. - pp. 345-353.

P Toren et al Zinc deficiency in ADHD [Journal] // Biological Psychiatry. - 1996. - 13 : Vol. 40. - pp. 1308-1310.

Prasad A S Zinc deficiency in women, infants and children [Journal] // J Am Coll Nutr. - 1996. - Vol. 15. - pp. 113-120.

Starobrat-Hermelin B The effect of deficiency of selected bioelements on hyperactivity in children with certain specified mental disorders [Journal] // Ann Acad Med Stetin. - 1998. - Vol. 44. - pp. 297-314.

Takeda A Relationship between brain zinc and transient learning impairment of adult rats fed zinc deficient diet [Journal] // Brain research. - 2000. - Vol. 859. - pp. 352-357.

Ward N I Assessment of chemical factors in relation to child hyperactivity [Journal] // Journal of Nutritional and Environmental Science. - 1997. - 4 : Vol. 7. - pp. 332-342.

Ward N I The influence of the chemical additive tatzine on the zinc status of hyperactive children [Journal] // Journal of Nutritional Medicine. - 1990. - 1 : Vol. 1. - pp. 51-58.

Yeiser E C Moderate zinc deficiency increases cell death after brain injury in the rat [Journal] - 2002. - Vol. 5. - pp. 345-352.