The role of oxidative stress in children with kwashiorkor – Are antioxidants helpful in the therapy?

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Introduction: Malnutrition is a big problem worldwide. A severe form of malnutrition in childhood is the “protein-energy-malnutrition” (PEM), better described as “global malnutrition” [8]. Marasmus (non-oedematous form) and kwashiorkor (oedematous form) are examples of PEM. Kwashiorkor is characterized by oedema, muscular dystrophy, changes of skin and hair, hepatomegaly, anaemia, apathy and anorexia. The pathogenesis of PEM is very complex. There are lots of theories, which try to explain the circumstances that lead to the manifestation of kwashiorkor. Inflammatory processes, aflatoxins and other factors are discussed in this context [11]. In the last years the focus is more and more put on the role of oxidative stress.

Materials and methods, experimental design, other methodological information: The aim of this bachelor thesis was to evaluate the study results on oxidative stress in children with kwashiorkor. The main focus was put on the question if antioxidants make sense in the prevention and therapy of the disease. The literature research in March 2011 in PubMed and Scopus was concentrated on the period 2000-2011, apart from one study of 1987. After a detailed examination of all papers found, 15 studies were selected for the bachelor thesis.

Results and discussion: The investigations of the last 20 years suggest that an increased activity of free radicals and a low concentration of antioxidants play an important role in the pathogenesis of kwashiorkor. Lower glutathione (GSH) concentrations can be found in children with kwashiorkor [6,7,13]. Some results show that other antioxidants, like vitamin E [12], or precursor amino acids of GSH, like cysteine [13], are reduced too. One study measures low levels of enzymatic antioxidants, like superoxide-dismutase and glutathione-peroxidase [15]. This data affirms that the protective antioxidative system is impaired in children with kwashiorkor. Additionally, parameters for oxidative and nitrosative stress, like o,o’-dityrosine, ortho-tyrosine, malondialdehyde and nitric oxide are increased [6,9,12,13]. The supplementation of antioxidants in the prevention of kwashiorkor does not show any positive effects [3]. Contrary to this, antioxidants may be helpful in the therapy. Supplementation with N-acetylcysteine (NAC), GSH and α-lipoic-acid leads to an increase of GSH-concentrations [1,2]. Time taken to lose oedema is significantly less in children receiving NAC [1]. One study shows a reduced lethality by one-third in the GSH-group when compared to the standard therapy group. While higher levels of GSH, total protein and albumin predict a better prognosis, children with moderate and severe skin lesions have a worse prognosis [2].

Conclusion: It is without controversy that oxidative stress plays an important role in the pathogenesis of kwashiorkor. However, it is very disappointing that there is only few data about the supplementation of antioxidants in the prevention and therapy of kwashiorkor. Antioxidants in the prevention of kwashiorkor do not make any sense. Contrary to this, supplementation of antioxidants in the therapy can show positive effects on the recovery of children with kwashiorkor. Apart from these results, it has to be considered that antioxidants in higher doses may be pro-oxidative. Therefore the symptoms of the disease are worsened rather than improved. Further research is needed before antioxidants can be included in the WHO treatment protocol for malnutrition.
**References:**


