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The Nutrition Society Irish Section Meeting was held at the University of Ulster, Coleraine on 20–22 June 2018

Editorial

Conference on 'Targeted approaches to tackling current nutritional issues'

Micronutrient deficiencies: current issues

Micronutrient deficiencies are of growing public health concern. An understanding of how micronutrient deficiencies affect health and measures that can be taken to improve micronutrient status are essential to improve population health. The main purpose of the 2018 Irish Section Meeting 'Targeted approaches to tackling current nutritional issues' was to provide an overview of current issues in relation to micronutrient status at various stages of the life-cycle. Novel biomarkers of nutrient status, global strategies to improve micronutrient status and implications for policy were also considered. The papers presented demonstrated recent advancements in this field and highlighted areas that warrant priority at the public health level, on both a national and global scale. Novel methods and biomarkers are being developed that will enhance the assessment of micronutrient status in specific population groups. It is evident that mild-to-moderate deficiency, or low status (in the absence of deficiency), of some micronutrients have important ramifications for public health that should be considered alongside the implications of severe deficiency. It is imperative that policy makers, public health workers and scientists work together to ensure that sustainable programmes are implemented to address micronutrient deficiencies at the population level.

Micronutrient deficiency: Vitamins: Iron: Iodine

Micronutrient deficiencies: a priority for public health

Micronutrient deficiencies are of growing public health concern. While iron, iodine and vitamin A deficiency have long been endemic on a global scale, vitamin D, vitamin B_{12} and riboflavin deficiency are also of concern. Food fortification and supplementation strategies have been successful in enhancing the status of certain micronutrients; however, alternative approaches are required to address issues such as low folate status in women of childbearing age and vitamin D insufficiency across the population, issues that should be a priority for public health. In addition to adverse health outcomes, micronutrient deficiencies can have substantial cost implications, e.g. a recent National Institute for Health and Care Excellence costing statement reports that primary care spending on treatments for vitamin D deficiency increased from £28 million in 2004 to £76 million in 2011[1], further highlighting the need to implement effective strategies for the prevention of micronutrient deficiency.

Vitamin deficiencies

Vitamin A deficiency is the leading cause of preventable blindness in low- to middle-income nations, with children and pregnant women being particularly susceptible. Public health intervention strategies such as the World Health Organization's vitamin A supplementation guidance for the reduction of morbidity and mortality in infants and children[2] are an effective low-cost intervention. However, in 2017 UNICEF reported that, of the countries deemed priorities for national-level vitamin A supplementation programmes, just over a third achieved coverage of 80 % or more in 2016[3]. Further work is thus needed to ensure more children can be protected. Fortification of oils and fats has been successful in improving vitamin A status and, more recently, biofortification has been shown to significantly increase vitamin A status across age groups[4].

The WHO estimate that 25 % of the population are vitamin D deficient worldwide. Following a Scientific Advisory Committee on Nutrition review of the dietary reference values for vitamin D, a daily intake of 10 µg vitamin D is now recommended in the UK[5]. Currently, Public Health England advise that a daily supplement containing 10 µg vitamin D is taken during the autumn and winter months. During these months, sunlight is of insufficient intensity for vitamin D_3 synthesis, thus reliance on dietary sources of vitamin D to meet requirements is increased. It is difficult to achieve this level of intake from natural food sources alone, thus alternative approaches are needed. To this end, the EU-funded ODIN project is investigating the efficacy of enhancing vitamin D status through food-based solutions. A vitamin D food fortification policy was introduced in Finland in 2003 and recent evidence

demonstrates the success of this approach in reducing vitamin D deficiency within the population[6]. The introduction of a similar policy in other countries is an area that has received much debate. Ongoing research in at-risk groups including the elderly, ethnic minorities, children, adolescents and pregnant women is critical to inform approaches aiming to optimise vitamin D status for health in these population groups.

The critical role of folate in the prevention of neural tube defects is widely acknowledged and in countries with mandatory folic acid fortification, substantial reductions in neural tube defects have been observed. In European countries that do not have a mandatory fortification policy, folic acid supplementation is recommended. However, this approach has been largely ineffective due to lack of compliance and neural tube defects rates have not declined between 1991 and 2011[7]. This is an issue that should be high on the public health agenda.

Emerging evidence suggests that low vitamin B_{12} status is associated with diseases of ageing including cognitive dysfunction, CVD and osteoporosis[8]. As older people are particularly susceptible to sub-clinical deficiency, due to food-bound B_{12} malabsorption, this is important from a public health perspective, especially considering our ageing population.

Research into gene–nutrient interactions is an evolving field, with emerging evidence in this area highlighting the importance of personalised nutrition. The 677C→T polymorphism in the gene encoding a key folate-metabolising enzyme, MTHFR, has been linked with adverse health outcomes including increased risk of CVD. New evidence demonstrates that intervention with riboflavin (a cofactor for MTHFR) induces a substantial lowering of blood pressure specifically in individuals with the *MTHFR* 677TT genotype[9] and thus has the potential for significant clinical impact.

Mineral deficiencies

Iron deficiency anaemia is the most common nutritional disorder in the world, affecting almost two billion people, particularly pregnant women and children in developing countries. Common approaches to addressing iron deficiency anaemia include iron supplementation, food fortification and nutrition education. Biofortification of staple food crops is a promising approach to improve iron status in developing countries, significantly increasing serum ferritin concentrations and total body iron[10]. This research warrants larger studies assessing functional outcomes and including additional at-risk groups.

Iodine is a key nutrient for brain development. Although severe deficiency is now relatively rare due to iodised salt programmes within countries, mild-to-moderate iodine deficiency during pregnancy is a public health problem in many countries, including the UK. Mild-to-moderate deficiency has been associated with impaired neurodevelopment of the child[11]. Randomised controlled trials of iodine supplementation in pregnant women with mild-to-moderate iodine deficiency, assessing cognitive outcomes of the children, are now needed to build on the existing evidence from observational studies. Furthermore, as there is no iodine fortification programme within the UK, women of childbearing age and pregnant women may be susceptible to a low iodine status. Current research is investigating strategies to increase iodine status in these population groups, e.g. through increased cow's milk consumption[12].

Conclusion

Significant advances have been made in relation to addressing micronutrient deficiencies worldwide albeit, there remain several areas of concern that should be a priority from a public health perspective. Alongside micronutrient deficiencies, the potential consequences of micronutrient excess/toxicity should also be considered, e.g. iron supplementation in iron replete children can adversely affect growth and development[13]. Contemporary research evidence highlighting targeted approaches to tackling micronutrient deficiency and implications for nutrition policy, as well as novel methodologies for assessing micronutrient status, are presented in the present issue of *Proceedings of the Nutrition Society* in the form of a series of review papers authored by the speakers at the 2018 Nutrition Society Irish Section meeting. Going forward, it is imperative that funding bodies and policy makers prioritise micronutrient deficiency and work together with the scientific community to ultimately improve the health of our populations.

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