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Geneeskunde en Gesondheidswetenskappe

ARE WE OXIDIZING OURSELVES WITH ANTIOXIDANTS?

BE CAREFUL OF THE SUPPLEMENTS YOU TAKE

The information explosion in the science of nutrition very often creates the impression that available information is contradictory. Consequently, it is no longer easy to distinguish between fact, misinformation and fiction. The Division of Human Nutrition, Faculty of Medicine and Health Sciences, Stellenbosch University act as a reliable and independent source of nutrition information.

It is of concern that a combination of the fast expansion of knowledge in nutrition, the inadequate policing of health claims of foods and supplements and a generally uninformed public more often than not impart and/or perpetuate the impression that if a "little of something" is good then "a bit extra" will be even better. It is also an equally significant concern that new emerging information on associations between food, nutrients and disease patterns is often used out of context by ignoring the complexity of the role of food in disease prevention and treatment thus encouraging the use and creating the expectation of benefit from "pill popping" practices. Yet, the accumulation of nutrition knowledge has consistently supported the "old", tested and trusted common sense concept that "excess can be harmful" in any given situation including the use of some nutrient supplements, singly or in combination, outside the scope of our food. The latest study published in the Journal of the American Medical Association is another piece of significant evidence which adds to the concept of "excess can be harmful" [this time on all-cause mortality (death)].

Supplementation of antioxidants could increase the risk of death

The combined data from 68 well conducted scientific trials with 232 606 participants in Europe, the Americas, Asia and Australia including lower- and higher-income countries, show that antioxidant supplements, singly or in combination with other nutrients, given at different doses and duration have the potential to do harm. The effects of these supplements were assessed in the general adult population as well as patients with diseases such as cardiovascular, neurological, skin, renal, endocrinological, gastrointestinal and inflammatory disease.

Should this raise concern?

The latest findings, reported by the authors of a meta-analysis which aimed to investigate the effects of antioxidant supplements containing beta carotene, vitamin A, Vitamin C, vitamin E and selenium on health and disease course, contradict those from observational studies that antioxidant supplementation improves health and well-being, a claim generally and frequently made for such supplements. The findings also add substance to the cautionary approach recommended in the scientific literature. A large proportion of the adult population, world-wide as well as in South Africa, use micronutrient antioxidant supplements. Yet, the balance of the available scientific experience indicates that the so-called "pill-popping" is not only generally ineffective, but it could also be dangerous. Certainly, the practice of single nutrient supplements (the so called "magic bullet") is no longer recommended for the general public.

Is this the first sign of a red light?

Previous studies also reported harmful effects and or a lack of any benefit of antioxidant supplementation. One such example is a well-known study in Finland of male smokers who received either α-tocopherol, β-carotene, both or placebo supplement revealed a 16% higher incidence of lung cancer and an 8% increase in all-cause mortality associated with high dose β-carotene supplementation. A similar trial which was conducted in the United States tested the effect of beta carotene and retinol (vitamin A) supplementation and reported a 28% increase in lung cancer incidence and more cardiovascular deaths.

The strength of the reported data

Only the effects of synthetic antioxidant supplements were measured and the effects cannot be translated to fruit and vegetable intake data and phytochemicals. In these trials adults were randomized to receive beta carotene, vitamins A, C, E and or selenium. Primary prevention trials (general healthy participants, 21 trials with 164 439 participants) and secondary prevention trials (participants with specific disease profiles, 47 trials with 68 167 participants) were included for analysis with antioxidant supplements at any dose, duration and route of administration. The main measured outcomes in the prevention trials were cancer and in the secondary prevention trials were acceleration of disease death. Antioxidant supplements taken singly or in combination with other vitamins, antioxidants or trace elements were analyzed.

Supplements were taken orally in doses ranging from lower than the Recommended Dietary Allowance (RDA) levels to higher than the UL (Tolerable Upper Intake Level) levels. Beta carotene was taken orally in doses ranging from 1.2 to 50.0mg (adult DRI: 3-6mg per day from food), vitamin A in doses from 1333 to 20 000IU (adult DRI: males 900µg or 2997IU and females 700µg or 2331IU per day from food and supplements combined), vitamin C 60 to 2000mg (Adult DRI: males 90mg and females 75mg per day from food and supplements combined), vitamin E 10 to 5000IU (adult DRI 15mg or IU per day from food and supplements combined) and selenium 20 to 200µg (Adult DRI: 55µg per day from food and supplements combined). Participants took the supplements orally daily or on every other day for close to a month (28 days) to 12 years in some cases. Most studies had a fairly long follow-up with the mean duration of follow-up 3.3 years.

Key findings:

- Better and urgent understanding of the mechanisms and actions of antioxidants in relation to disease and disease progression is needed
- Singly or in combination with other supplements, supplementation with beta carotene increased mortality significantly
- Vitamin A supplementation in combination with other supplements, increased mortality significantly
- Vitamin E given on it's own or in combination significantly increased mortality
- Vitamin C supplementation was not found to increase mortality or longevity
- Selenium given in combination or as a single supplement was found to have no significant effect on mortality; it tended to have a protective effect, but more research is necessary to confirm this effect
- Beta carotene, vitamin A and vitamin E in single preparations or in different combinations significantly increased mortality
- This data is not relevant in populations with specific needs and confirmed deficiencies of antioxidants or other nutrients

Should one take nutrient supplements?

If you think you need supplements, it would be more beneficial to consider the following:

- Make sure you are consuming an adequate diet which includes a variety of foods
- Consult an expert on the adequacy of your diet
- Avoid supplements with glamorous multi-claims which cannot be substantiated when scrutinized
- Avoid single nutrient supplements
- Check the composition of the supplement you plan to take or you are taking

- Choose a multi-vitamin, multi-mineral supplement that contains up to 2-3 times the recommended intake (see Table)
- Reassess your need to take such supplements regularly and for prolonged periods
- Report to your doctor any adverse effects you think may be linked to the supplements

Conclusion:

It should be well remembered that the only consistent evidence one finds in the literature is that the regular consumption of fruit and vegetables (which contain antioxidant nutrients and phytochemicals) is preventive of disease. The “leap of faith” that has led to an explosion in the marketing of supplements containing one or more antioxidant nutrients in synthetic forms and concentrated doses for the protection and treatment of the so-called diseases of lifestyle is not only simplistic but may have inherent dangers, especially when taken in excess. Additionally, such practices, appear to ignore the collective contribution and complex interaction of these compounds, which may well be the very essence of the protective effects of fruit and vegetables.

Nevertheless, the effective and necessary use of supplements which is currently recommended in certain nutrient deficiency states as for example, high dose vitamin A supplements in children younger than 6 years of age in the developing world remain as one of the most cost-effective intervention policies in reducing child mortality and preventing blindness.

There can be little doubt that, as is customary, this study, like any other, will be criticized for its limitations (which the authors acknowledge) in various ways. Nevertheless, the implications of these findings cannot, and should not, be ignored.

For further, personalized and more detailed information, please contact a dietitian registered with the Health Professions Council of South Africa.

References from the scientific literature used to compile this document are available on request.

Human Nutrition | Menslike Voeding
Fakulteit Geneeskunde en Gesondheidswetenskappe /
Faculty of Medicine and Health Sciences
Universiteit Stellenbosch University
Francie van Zijl Rylaan / Drive; Tygerberg; Kaapstad / Cape Town
Posbus / PO Box 241; Kaapstad / Cape Town; 8000
Suid-Afrika / South Africa
Tel: +27 21 938-9259
e-pos / e-mail: irene@sun.ac.za
www.sun.ac.za