Antioxidants in the Finnish press: a battlefield of alternative and conventional medicine

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SUMMARY
Antioxidants have received a considerable amount of attention in the Finnish mass media. One of the basic points in the Finnish discussion has been the use of nutritional supplements as a source of antioxidants. In this study, we aim to account for the widespread use of antioxidant supplements by examining the public discussion about antioxidants in the Finnish lay press. To do that, we will describe the characteristics associated with antioxidants in the lay articles, find out what advice is given about antioxidant sources in the diet, and see what kind of criteria are used in the comparison between food and supplements as sources of antioxidants. We will also deal with the role of doctors and nutritionists in modifying the public attitudes towards supplement use. The material of this study consisted of 200 antioxidant-related articles published in a newspaper, a women’s magazine and two health magazines in the volumes of the years 1988, 1991 and 1994. The representatives of different media were those with the widest circulation. As study methods, we used quantitative and qualitative content analysis of the antioxidant-related articles. The reliability of the classification was tested in a sub-sample by two independent coders. In the study material, antioxidants were associated with vitality and good looks. Opinions on the efficiency of food and supplements as health promoters were conflicting, and it was often feared that our diets do not contain antioxidants in sufficient amounts. Experts in nutrition and medicine adopted a dual role. Acknowledged researchers recommended a balanced diet, but some of the doctors and nutritionists were eager to recommend antioxidant supplements. One of the health magazines clearly supported the alternative medicine.

In the case of antioxidants, the role of conventional versus alternative medicine was opposite to the traditional picture. The conventional medicine recommended a wholesome diet, and the alternative therapy offered supplement pills.

Key words: antioxidants; experts; media; supplements

INTRODUCTION
Mass media are the most popular source of nutrition information for consumers (Goldberg and Hellwig, 1997). Public discussion can affect attitudes and health behaviour among the readers (Mazur, 1981; Pfund and Hofstadter, 1981; Aro and Halttunen, 1990; Nelkin, 1991; Lupton, 1994). The relationship between scientific findings and their presentation in the lay press is, however, problematic. The importance of new findings is often exaggerated and sensationalized in the media, and their limitations are reported later in a pessimistic tone (Pfund and Hofstadter, 1981; Freimuth et al., 1984; Nelkin, 1987). To the public, it may appear that the researchers are always changing their minds (Goldberg and Hellwig, 1997).

In Finland, antioxidants have been widely discussed in mass media. Scientific research has
shown that antioxidants may play a role in the etiology of chronic illnesses, e.g. cancer (Byers and Perry, 1992; Ames et al., 1993) and cardiovascular disease (Ames et al., 1993; van Poppel et al., 1994). While antioxidant-containing fruits and vegetables may protect against some of these diseases (Statens beredning för utvärdering av medicinsk metodik, 1997), supplemental use of antioxidants has not been shown to prevent chronic illnesses. Recent studies suggest that Beta-Carotene supplementation may even be harmful in some population groups (The Alpha-Tocopherol, Beta Carotene Cancer Prevention Study Group, 1994, Omenn et al., 1996). However, vitamin and mineral supplements are commonly used in many Western countries (Worsley and Crawford, 1984; Subar and Block, 1990; Dorant et al., 1993; Elmståhl et al., 1994; Slesinski et al., 1995). Among the most popular supplements are those containing vitamins or trace elements which have antioxidative properties, e.g. vitamin C (Worsley and Crawford, 1984; Subar and Block, 1990; Dorant et al., 1993; Elmståhl et al., 1994) or selenium (Elmståhl et al., 1994). It seems that by using vitamin and mineral supplements, people wish to maintain health, prevent cancer and cardiovascular disease (Aro and Aro, 1995), retard ageing (Roe, 1993) or deal with stress (Barrett and Herbert, 1994).

In the Finnish mass media, one of the basic points in the discussion concerning antioxidants has been the use of nutritional supplements as antioxidant source. The debate was lively particularly after the publication of a large cancer prevention study with Beta-Carotene and vitamin E supplementation in April 1994 (The Alpha-Tocopherol, Beta Carotene Cancer Prevention Study Group, 1994). This study carried out among 29 000 Finnish men showed no beneficial effect of antioxidant supplements in cancer prevention except for a reduction of prostate cancer incidence with alpha-tocopherol.

In this study, we aim to account for the widespread use of antioxidant supplements by examining the public discussion about antioxidants in the Finnish lay press. To do that, we will describe the characteristics associated with antioxidants in the lay articles, find out what advice is given about antioxidant sources in the diet, and see what kind of criteria are used in the comparison between food and supplements as sources of antioxidants. We will also deal with the role of doctors and nutritionists in modifying the public attitudes towards supplement use.

MATERIALS AND METHODS

Materials

To achieve an overall picture of antioxidants in the Finnish press, we included in this study three categories of media likely to contain articles about antioxidants: newspapers, women’s magazines and health magazines. Within each category, we selected the paper or magazine which had the widest circulation (Levikintarkastus Oy). Thus, Helsingin Sanomat represented newspapers and Anna women’s magazines. As two of the health magazines had a similar circulation, we decided to include both of them in the study (Kotilääkäri = health magazine A, Voi Hyvin = health magazine B). We restricted the study material to the volumes of the years 1988, 1991 and 1994, covering the publication date of the ATBC Cancer Prevention Study. The inclusion of different types of media in the study gave a broad view of the public discussion about antioxidants in the Finnish press. Even if the study material does not represent the Finnish newspapers, health magazines or women’s magazines in general, each of the chosen media has a wide circulation and offers a logical example of the category. The time dimension of 6 years was too short a time for tracing secular trends. Most differences between the volumes were small and probably resulted from random variation.

The following terms were used in order to select antioxidant-related articles:

- antioxidant;
- oxidation/rancid/free radicals;
- Beta-Carotene/vitamin A/retinoid/carotenoid;
- vitamin E/tocopherol;
- vitamin C/ascorbic acid;
- selenium;
- ubiquinone;
- flavonoid;
- names of some well-known Finnish researchers in the antioxidant subject.

If any of these words appeared in the headline, ingress or the first three paragraphs of an article, the article was photocopied and included in the study material. At a later stage, 18 articles covering only external cosmetic use of antioxidants or oxidation of non-living objects were excluded from the study. The final sample size was 200 articles.
Methods
As study methods, we used qualitative and quantitative content analysis. Quantitative results are presented numerically in the form of percentages of the articles including a certain feature or of comparisons between different media. Qualitative results are presented verbally and they aim at making classifications and generalizations over the issues of interest. After preliminary investigation of the study material, we composed a list of variables. The variables were classified into five groups: background information (e.g. the author of the article); source of information and main subject (e.g. which antioxidants were mentioned in the article); food versus supplements as a source of antioxidants (e.g. recommendations about antioxidant sources given in the article); characteristics of antioxidants (e.g. antioxidants and cancer prevention); and images created by the article (e.g. the use of military terms in the article). We tested the reliability of the variables in a sub-sample \((n = 36)\). The testing was performed by two independent coders. To calculate the coefficient of reliability for each variable, we used the formula presented by Krippendorff (Krippendorff, 1989). The reliability of the original variables was generally too low. On the basis of the test results, we modified the list of variables by changing the wording of the variables, re-grouping them and adding instructions for the coders. The modified list consisted of 129 variables. We tested the reliability again in a subsample \((n = 20)\). We considered the variables and groups of variables with a coefficient of reliability at least 0.67 reliable for quantitative analysis. In most cases, the unreliability of classification resulted either from the abstract nature of the variable or from the infrequency of the category in the study material. The 44 variables with insufficient reliability were used only for qualitative analysis. For many variables, the qualitative approach gave more relevant results than quantitative analysis.

Although the term antioxidant is commonly used in scientific as well as popular literature, it proved to be somewhat problematic. The term is scientifically defined on the basis of the mechanism of action, while most of the nutrients considered as antioxidants have also other possible mechanisms of action in the human body. For instance, it was not known if vitamin C was assumed to prevent cold because of its antioxidative character or vitamin effect. We included into the list of variables the substances that were considered antioxidants in any of the articles, and treated them as antioxidants irrespective of the assumed way of action. However, the vitamin A and D supplements for children were not classified as antioxidant supplements, as they are clearly recommended because of their vitamin action.

RESULTS
Attributes given to antioxidants
The antioxidants most often mentioned in the study material were vitamin C \((51\%\) of the articles, \(n = 200)\), vitamin A \((35\%\)\), vitamin E \((35\%\)\), Beta-Carotene \((26\%\)\) and selenium \((22\%\)\). The number of antioxidants mentioned in the articles was higher in 1994 than in the volumes of the earlier study years. Ubiquinone, glutathione and uric acid appeared in the volumes of 1994 for the first time; and lycopene, carotenoids, flavonoids and enzymes were mentioned more often in 1994 than in earlier years.

The language in the articles was colourful. The writers described the effects of antioxidants with words like *liveliness, stamina, fitness, vigour, alertness* and *pep*. The terms referred to a subjective feeling of well-being, which is difficult to define or measure precisely. On the other hand, free radicals were associated with frightening qualities and the interaction of free radicals and antioxidants was described in military terms. Free radicals were identified with *devastation, attack, bombing and hiroshima*. The role of antioxidants was described as *battle, defence, front and protection*. The vitality and happiness associated with antioxidants could also be seen in the illustrations of the articles. In several pictures smiling, healthy young women were doing something nice, like exercising or eating fruit. The study material also contained pictures illustrating the danger caused by free radicals, e.g. a photo of worried-looking, hunched smokers.

Apart from images created by colourful terms and illustrations, antioxidant use was often explicitly associated with vitality and good looks. Differences between the newspaper and magazines were large. In the newspaper, 3% of the articles referred to vitality and 1% to appearance \((n = 80)\). Opposite to this, in the women’s magazine vitality and appearance were both mentioned in 32% of the articles \((n = 19)\). The health magazines referred to vitality \((12\%, n = 58\) and 23%, \(n = 43)\) more often than to appearance \((5\%, n = 58\) and 19%, \(n = 43)\).
Diseases or ageing were discussed in nearly half of the articles (48%, n = 200). Cancer (21%) and cardiovascular disease (17%) were mentioned most often. In many articles, the ability of antioxidants to prevent these diseases was considered certain. Study results about the prevention of cancer and cardiovascular disease were often cited, but negative results appeared only after the publication of the Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study (Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study, 1994).

Supplements or foods?

More than half of the articles (53%) included recommendations about sources of antioxidants. Food was recommended as a source of antioxidants in 38% of the articles, while supplement use was recommended in almost as many (32%). The foods most often recommended as a source of antioxidants were vegetables, fruits and berries. They were dealt with in 30% of the articles. Foods from other food groups were recommended on the basis of their antioxidant content in ~10% of the articles. In 1994, 6% of the articles (n = 88) treated the flavonoid content of tea and red wine. In some articles plants like nettle, strawberry leaves, seaweed, rowanberries, bog whortleberries and birch leaves were recommended as an antioxidant source. However, these herbs do not belong to an ordinary Finnish diet and are not sold in grocer’s shops.

The different types of media adopted a different attitude towards the supply of antioxidants (Table 1). In the newspaper the majority of articles did not discuss sources of antioxidants, and supplements were recommended as a source in 8% (n = 80) of the articles. In the women’s magazine, food was recommended more often than in the other publications, while one of the health magazines recommended supplements more often than food.

The criteria that media used when they were comparing the advantages and disadvantages of supplements and food can be classified as naturalness, balance, efficiency and cost. Naturalness was usually seen as an advantage of food as a source of antioxidants:

Well, vitamins! Where did the Finns get their vitamins 5000 years ago when they did not have the faintest clue of antioxidants? Turnip and swede! There is the secret of a healthy life for you: pure basic food, vegetables, berries and fruits. No pill boxes are needed for it. (Health magazine A 5/1994)

On the other hand, due to processing or efficient fertilization food was sometimes seen as unnatural:

Today’s artificially fertilized enormous carrots hardly contain any Beta-Carotene, we are told. (Health magazine A 9/1988)

Naturalness was used as a criterion when comparing different supplements as well. Supplements processed from plants were in some articles considered more natural than synthetic preparations. As well as natural, food was considered a balanced and safe source of antioxidants. It was argued that food contained different antioxidants in appropriate proportions without a danger of overdosing. It was proposed that food can also contain other wholesome substances that are not yet known and thus not available as pills:

All the substances that affect human health are not yet known, and are thus not available as drugs. However, a balanced diet most likely contains them. (Newspaper 21.3.1988)

Correspondingly, it was stated that supplements may not contain all the health-promoting nutrients, they may disturb the balance of different antioxidants in the human body, or they may interfere

Table 1: Recommendations about sources of antioxidants in different media (%)  

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Women’s magazine&lt;sup&gt;a&lt;/sup&gt; (n = 19)</th>
<th>Newspaper&lt;sup&gt;b&lt;/sup&gt; (n = 80)</th>
<th>Health magazine A&lt;sup&gt;c&lt;/sup&gt; (n = 58)</th>
<th>Health magazine B&lt;sup&gt;d&lt;/sup&gt; (n = 43)</th>
<th>Total (n = 200)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only food</td>
<td>36.8</td>
<td>23.8</td>
<td>20.7</td>
<td>7.0</td>
<td>20.5</td>
</tr>
<tr>
<td>Only supplements</td>
<td>10.5</td>
<td>5.0</td>
<td>19.0</td>
<td>30.2</td>
<td>15.0</td>
</tr>
<tr>
<td>Both</td>
<td>26.3</td>
<td>2.5</td>
<td>22.4</td>
<td>32.6</td>
<td>17.0</td>
</tr>
<tr>
<td>No recommendation</td>
<td>26.3</td>
<td>68.8</td>
<td>37.9</td>
<td>30.2</td>
<td>47.5</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

<sup>a</sup>Anna; <sup>b</sup>Helsingin Sanomat; <sup>c</sup>Kotilaakäri; <sup>d</sup>Voi Hyvin.
with the absorption of other nutrients. Supplements could also be harmful to health if taken in overdoses. Again, supplements manufactured from plants were recommended in some articles as a more balanced alternative:

It is sensible to choose a product in which the vitamins are in balance with each other. For example, pills produced from nutritious berries or plant parts seem a good alternative. (Health magazine A 10/1991)

The third criterion used in the comparison of supplements and food was cost. Compared with food, supplements were usually seen as an expensive source of antioxidants:

The most reasonable way to ensure the supply of vitamin E is to buy e.g. cheap vegetable oil instead of supplements. (Women’s magazine 11.10.1988)

However, in one of the health magazines wholesome foodstuffs, e.g. fruits and vegetables were considered expensive as well, and the readers were advised to save money by choosing the cheapest kind of supplements:

If you have no money, you can’t afford fruit and vegetables—not to speak of vitamin pills. (...) The prices of vitamin C vary considerably depending on whether you want to use sweetened, water-soluble tablets or not. (Health magazine A 11/1991)

As a conclusion, naturalness, balance and reasonable price were in most cases associated with food even if in few cases they could also be properties of supplements. Opinions on the efficiency of food and supplements as health promoters were most conflicting (Table 2). A healthful diet was seen as an effective way to protect health:

(...) a low-fat diet with plenty of vegetables is certainly good for health. (Health magazine A 5/1994)

A varied diet may be the best way to prevent cancer. (Newspaper 15.5.1994)

On the other hand, it was often believed that diet does not contain antioxidants in sufficient amounts:

Only about five percent of the Finns follow a healthful diet, and the rest would need dietary advice and also supplements to prevent illnesses. (Newspaper 9.10.1988)

Moreover, it was maintained that even a diet composed in agreement with nutritional recommendations does not contain enough antioxidants:

(...) a daily dose of 100 mg vitamin E is sufficient for Finns, but such an amount can not be obtained even from a varied diet. (Health magazine A 8/1994)

In many articles, supplements were seen as an easy way to guarantee the sufficient supply of antioxidants:

Professor X emphasizes the significance of berries, fruits and vegetables, but supposes that a daily pill of vitamin E is not bad for anyone. (Health magazine A 8/1994)

Some writers adopted a more cautious attitude towards supplement use. It was noted that scientific studies have not confirmed the health-promoting properties of antioxidant supplements. It was not believed that supplements could counteract the effects of unhealthy habits:

There is no pill in the world that could counteract the adverse effects of fast food containing too much salt and fat. (Health magazine B 5/1994)

Supplements were also feared to give a false feeling of safety:

The fact is that he believes that he can smoke without any risk. Those magic brown pills are his safeguard

Table 2: Views about the effectiveness of food and antioxidant supplements as health promoters

<table>
<thead>
<tr>
<th>Food</th>
<th>Supplements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective</td>
<td>• the health-promoting qualities are well known</td>
</tr>
<tr>
<td></td>
<td>• the natural antioxidants are more effective than synthetic ones</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Uneffective</td>
<td>• the supply of antioxidants is not high enough</td>
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</tbody>
</table>
against cancer. How many other smokers are there, besides my husband, who childishly believe that smoking is harmless for them as long as they swallow a capsule every morning? (Newspaper 14.11.1988)

The role of doctors and nutritionists in the antioxidant debate

The role of experts in antioxidant-related articles was evaluated by two variables: the writer of the article and the informative source used for the article. When a qualified doctor or nutritionist, or a person conducting scientific research on the subject, was the writer of the article, supplement use was recommended more often (50%, n = 26) than in the other articles (29%, n = 174). In contrast, food was recommended more often (51%, n = 41) when a doctor, nutritionist or researcher had been interviewed as an expert than in the other articles (34%, n = 159).

The role of nutritional or medical experts was different in Health magazine B than in other media. Health magazine B did not use doctors, nutritionists or researchers as their information sources as often as the other media (2%, n = 43 compared with 25%, n = 157). Authorities were not interviewed for any article in the magazine, although in other media they were used as a source of information in 5% of the articles (n = 157). On the contrary, an expert appeared as the author of the article in Health magazine B more often than in the other media (30%, n = 43 versus 8%, n = 157). In 1994 the magazine started to publish a series of articles in which representatives of alternative therapies gave advice on the treatment of different symptoms and diseases. Among the writers of the series there was a nutritionist and a doctor giving antioxidant therapy. Health magazine B did not write about the negative results of the ATBC Cancer Prevention Study.

In many articles, there was a juxtaposition between conventional, evidence-based medicine and the so-called alternative treatments with large doses of antioxidants. Recommended dietary allowances of different nutrients (e.g. vitamin C and vitamin E) were considered old-fashioned and too low, and they were not considered to suit the majority of the Finnish population. The attitudes of the Finnish authorities towards antioxidant therapy was in some articles described as old-fashioned and stubborn:

Why are the authorities so much against vitamins and trace elements, although there is not enough knowledge of the need. (...) They do not want to hear anything positive about vitamin and mineral therapy. (Newspaper, supplement 1 July 1988)

On the other hand, the unwillingness of authorities and researchers to recommend antioxidant supplements was seen as a consistent and critical attitude. Antioxidant doctors were considered swindlers who gain economical profit by using inappropriate laboratory tests and ineffective drugs for severely ill patients.

DISCUSSION

Reporters aim to attract readers by using colourful language, and they often create metaphors to explain complex issues in an understandable way (Nelkin, 1987). In this study, the effects of antioxidants were described in vivid terms. Antioxidants were associated with a strong image of vitality, which is attractive in the cultural climate admir ing youth, beauty and efficiency. When describing the mechanism of action of antioxidants, the writers often used a military metaphor. The human body was seen as a battlefield in the war between the good antioxidants and the bad free radicals. Overall, the strong positive values associated with antioxidants and the frightening qualities attributed to free radicals clearly served to attract readers and may have increased their interest in using antioxidant supplements as well. We feel that positive ideas like vitality, good looks and energy could be emphasized in public health education campaigns as well. Instead of antioxidant supplements, they should be linked to scientifically sound advice like physical exercise and a low-fat diet with plenty of fruits and vegetables.

Goldberg and Hellwig (Goldberg and Hellwig, 1997) have proposed that media messages surrounding nutrition are often inconsistent and confusing. They point out that scientific observations are often described as fact by the media, even though the results may be far from conclusive. Accordingly, we found that the ability of antioxidants to prevent diseases like cancer and cardiovascular disease was presented as fact in many lay articles, giving an overly optimistic view about the health-promoting potential of antioxidants and, very likely, making the use of antioxidant supplements more appealing. We agree with Goldberg and Hellwig (Goldberg and Hellwig, 1997) in that to improve the process of
communicating scientific findings to the public, the researcher should provide context to the reporter. It is important to emphasize that the results of a single study are not the final truth, but merely one step forward in the complex scientific process. The researcher should also aim at explaining to the reporter the potential sources of error associated with the study design and the limitations in generalizing the study results.

Compared with supplements, food was considered a natural, balanced and cheap source of antioxidants in the Finnish press. It was often feared, however, that our diets do not contain different antioxidants in sufficient amounts. The mistrust may arise from the fact that a large proportion of our diet consists of industrial foods. Industrial processing has been accused of robbing foods of vitamins as early as the 1930s (Levenstein, 1993). It is also claimed that the food supply is nutritionally inadequate because the soils are depleted by modern agriculture (Barrett and Herbert, 1994). Considering these claims, it may be that the criterion naturalness stands up for supplement use; the products of modern agriculture and food industry are not considered natural, and supplements are needed to restore the natural vitamin and mineral content. Recommending unusual plants like nettle and birch leaves as sources of antioxidants may also be a reflection of distrust towards the nutritional content of fertilized plants. We believe that the criteria used by the media in comparison of food and supplements should be taken into account by nutrition educators. They could stress the naturalness, nutritional balance and reasonable price of food, and emphasize that there exists scientific evidence in favour of a prudent diet.

To our knowledge, the contribution of nutritional and medical experts in public discussion about antioxidants has not previously been studied. Our results show that the experts have adopted a dual role in the antioxidant issue. Acknowledged researchers and authorities, as representatives of conventional medicine, do not recommend antioxidant supplements in the contemporary stage of scientific knowledge. They stand for a healthy lifestyle and a balanced diet as the most effective way of promoting public health. Some doctors and nutritionists, however, are eager to recommend antioxidant supplements to promote health and to prevent or cure illnesses. One of the health magazines included in this study (Health magazine B) clearly represented the alternative ideology. Antioxidant supplements were recommended markedly often in the articles, and the magazine ignored the negative results of the ATBC Cancer Prevention Study. Experts were rarely interviewed in this magazine, but the articles were often written by a doctor or nutritionist.

The motives lying behind the active promotion of supplement use are likely to be economical. Those who obviously benefit from the popularity of supplements are the manufacturers and importers of the preparations. Barrett and Herbert (Barrett and Herbert, 1994) have noted that:

Faddists and quacks urge everyone to distrust large food companies, government regulators, and scientific health professionals. This negative philosophy is essential because without it, consumers would have no reason to buy health food industry products or to consult ‘alternative’ practitioners.

In our study material, the competence and motives of research workers and authorities were sometimes suspected, and nutritional recommendations were in some articles considered out-dated.

The suspicion toward authorities, researchers and nutritional recommendations, expressed in the articles, causes confusion among the public and debilitates consumers’ confidence in the health-promoting qualities and a sufficient nutrient content of a proper diet. It is interesting to note that the role of conventional versus alternative medicine in the antioxidant controversy was opposite to the traditional picture of conventional medicine as treating illnesses with drugs and alternative therapies as soft and natural treatments. In this case of antioxidants, it was the conventional medicine that recommended a wholesome diet, and the alternative therapy that offered artificial supplements.

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