

SALT AND BREAD IN THE NEW MILLENNIUM

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Introduction

Food is a vital and important part of life. With our increasingly hectic lifestyles, we are eating more and more ready prepared and processed foods and we still have the record in the western world of being one of the countries with the greatest number of deaths from strokes and heart attacks. We need, therefore, to look closely at certain aspects of our diet, but without any reduction in the enjoyment of the food we eat. There are four major factors that make a heart attack or a stroke more likely:

1. Increasing blood Pressure
2. Smoking
3. Raised cholesterol
4. Presence of diabetes

We need to address all of the above, but this article will focus on blood pressure alone. The increasing risk of heart attacks and strokes with blood pressure is continuous and throughout the range, that is, the higher the blood pressure, the greater the risk even if it is within the normal range. This is very important because from a strategic point of view we need to have a more global strategy.

Strategy

In order to confront the problem of blood pressure in a population, we need to:

- (a) seek out and treat individuals who have high blood pressure,;
- (b) adopt strategies for the whole population that will reduce the average blood pressure in that population;
- (c) adopt measures that will reduce the rise in blood pressure that occurs in all western populations with age;

(d) combine all of these with a reduction in other risk factors, e.g. decrease fat intake, stop smoking, increase fruit and vegetable consumption.

Salt and blood pressure

Clearly, to adopt this preventive strategy, it is essential to know what are the important factors in regulating blood pressure particularly on the basis of the whole population, the rise in blood pressure with age and the numbers of people who develop high blood pressure. We can identify five factors which do seem to be important in regulating blood pressure. One is salt intake, the other is potassium intake which is largely dependent on fruit and vegetable consumption, obesity particularly when it is male pattern obesity, are important factors, excess alcohol puts up blood pressure, but the effect appears to be transient, it is likely the role of alcohol in causing sustained increases in blood pressure has been exaggerated. Independent of diet, but an important factor is the amount of exercise that is taken. Of all these, it is clear that salt intake is one of the most important. Evidence for salt being involved in blood pressure comes from six lines of research.

Evidence for salt

(a) Epidemiological studies - This is where comparisons are made between different countries and within countries where measurements have been made of blood pressure, salt intake as judged by 24 hr urinary excretion and other factors that are thought to be important in regulating blood pressure. These studies clearly show that in communities that do eat small amounts of salt there is no rise in blood pressure with age and very few people develop high blood pressure with the average blood being lower whereas in high salt communities, blood pressure rises with age, there are more people with high blood pressure and the population blood pressure on average is higher¹.

(b) Intervention studies - A study in adults from Portugal, a country that has one of the highest salt intakes in Europe and the highest stroke rate, compared two villages where one village was advised to reduce salt intake and given processed food and bread with less salt whereas the other village had similar measurements of blood pressure but no dietary advice was given. Importantly, in the village that reduced salt intake, they were successful in getting salt down by approximately half. After one year there was a significant difference in blood pressure which became more significant at the end of the two years². A careful double blind study in newborn babies over the first six months of life also demonstrated the importance of salt intake early in life in determining blood pressure at the time and also when followed up at 15 years³.

(c) Migration studies - There are several studies where groups of individuals have moved from one environment to another and blood pressure has changed. The best controlled one is in Kenya where the rise in blood pressure going from a rural to an urban environment was closely related to the increase in salt and a reduction in potassium intake⁴.

(d) Evidence in animals - All forms of high blood pressure in animals are either caused, precipitated or exacerbated by an increase in salt intake. The best controlled

study is one in chimpanzees where when salt intake was increased from the same amount that we ate during the last million years of evolution and is the normal diet of chimpanzees, i.e. half a gram of salt a day, to our current intake of 10 to 15 grams, there were large rises in blood pressure over the year and a half of the study. It is difficult to imagine why chimpanzees should be different from humans⁵.

(e) Genetic studies in man - Recent studies have shown that where abnormalities in the genes that either cause low or high blood pressure, all those that cause high blood pressure involve a direct effect in reducing the kidney's ability to excrete salt and those that involve low blood pressure all directly involve the kidney's ability in not being able to hold on to salt, the former being made worse by a high salt intake and the latter being ameliorated by a high salt intake. These clearly demonstrate the great importance of sodium balance and salt intake in regulating blood pressure in man.

(f) Salt restriction - Many studies have looked at the effect of restricting salt intake on blood pressure over a short period of time. It must be realised that, whatever causes the rise in blood pressure that occurs in western countries with age and the gradual rise in blood pressure that occurs in patients that develop high blood pressure, occurs over many decades and whatever that factor is, it is unlikely to reverse it within a few days or weeks so that it is somewhat surprising to find that salt restriction over a period of a few weeks does lower blood pressure so that quite modest reductions in salt intake say from 10 to 5 grams of salt a day do cause significant falls in blood pressure in a population which are large enough to have a significant impact at a population level on the numbers of strokes and heart attacks that would occur^{6,7}. All of the other evidence suggests that if this salt reduction was continued for a much longer period than a few weeks, the benefits would be much greater particularly on reducing or even abolishing the rise in blood pressure with age that occurs in all developed countries and considerably reducing the number of people with high blood pressure in that community.

Other harmful effects of our high salt intake

More recently it has been realised that our high salt intake may have other adverse effects on our health. It is important to realise that on a high salt intake we retain fluid, expanding the amount of fluid inside the body and that this triggers mechanisms to tell the kidney to increase the salt intake in the urine to balance the amount being eaten. This results in an increase of approximately 1.5 litres of additional fluid in the body, i.e. 1.5 kgs.

Strokes

Recent evidence has suggested that when the deaths from stroke are plotted against urinary salt excretion in different countries, there is a very close relationship between deaths from stroke and salt intake suggesting that salt intake may not only cause strokes through increasing blood pressure but may have direct effect in increasing the number of people with strokes in the community. Studies in animals also support this concept⁸.

Cancer of the stomach

Salt intake is also closely related to stomach cancer which is the second commonest cause of death from cancer in the world and several countries have advocated reducing salt intake in order to reduce the number of people with cancer of the stomach as does the World Cancer League⁸.

Osteoporosis

Salt intake is the most important determinant of calcium excretion and it has now been realised that it leeches calcium from bone over a long period of time and, therefore, may well play an important role in bone demineralisation or osteoporosis. The National Osteoporosis Society now recommends a reduction in salt intake to try to prevent long-term bone thinning⁸.

Summary

There is, therefore, a wealth of evidence that suggests that salt intake is an important factor in determining blood pressure levels in a community, the rise in blood pressure with age and the number of people with high blood pressure. There is also increasing evidence that our current salt intake has other important independent deleterious effects. Not surprisingly, therefore, nearly all nutritional and medical bodies that examined the evidence have recommended a reduction in salt intake from approximately 10 to 5 grams a day. However, none of these worldwide recommendations have been implemented. If anything, salt intake is now increasing as we consume more and more processed and ready prepared foods which are very high in salt. Recent studies have confirmed that approximately three quarters of our salt intake now comes from processed food. Clearly, the public can reduce the salt that they add to food and the salt they use in their own cooking, but as this only makes up a quarter on average of salt intake, it is only going to have a small effect. It is therefore essential, if salt intake is going to fall, that the salt concentration of processed and ready-prepared foods is reduced.

Commercial interests

However, salt is of vital commercial interest to the salt manufacturers, to those companies who have soft drink interests and to some companies in the food industry, particularly those that make meat products.

(a) Salt is by far the cheapest flavour enhancer and will make foods that are inedible, palatable at no cost. Once high salt-containing foods are consumed the salt taste receptors in the mouth are suppressed and this gives the individual a marked preference for high salt foods and a habituation to them.

(b) If large amounts of salt are added to food, particularly to meat products, water can be added, increasing the weight by up to 20% at no cost.

(c) Salt intake in temperate climates is a very important determinant of fluid intake. A reduction in salt intake from 10 to 5 grams a day would reduce fluid intake in the population by approximately one third of a litre. This would result in a very large fall in soft drink sales.

It is perhaps not surprising, therefore, that the salt manufacturers, the soft drink industry and some processed food manufacturers have spent a huge amount of money in creating an entirely artificial debate suggesting that the evidence relating salt intake to blood pressure is either insubstantial or the evidence is not sufficient to act on or introducing an entirely fictitious myth that moderate reductions in salt intake might be dangerous.

Bread

Bread is an important part of a healthy diet, but unfortunately for historical reasons, is high in salt. Each slice of bread contains approximately 1/2 gram of salt so that 4 slices of bread in a day would make up one third of our recommended intake of salt. The salt concentration of bread was reduced in the mid 1980s by around 12% without anyone noticing. Studies that the Federation of Bakers did in collaboration with the Department of Health in the late 1990s also showed that salt intake could be reduced by up to 20% with no technical problems and no loss of flavour. Salt concentration of bread currently available in the UK ranges from 0.4 gm sodium (1.0 gm salt)/100 gm) to 0.8 gm sodium (2.0 gm salt)/100 gms with no clear justification of these large differences (i.e. 100%).

Policy

Clearly, no-one is suggesting that salt should immediately be removed from processed foods as the change in taste would be unacceptable. By far the best way to proceed is to make gradual small reductions in the salt concentration at a level where the customer is unable to detect the difference, i.e. 10 to 20%. Once the consumer has got used to this over 2 or 3 years, a further similar reduction can be made, so that by the end of 10 years major reductions in the salt concentration could be made resulting in a reduction in total salt intake near to the target of 6 grams/day. Several of the major retailers are currently carrying out such programmes across all of their products. There are no commercial reasons for so much salt to be added to bread and if bread is continued to be seen as a healthy eating choice and a staple of the UK diet which it should be, it is imperative that the salt intake of bread is gradually reduced. This reduction in salt intake down to approximately 6 grams will have a major benefit in reducing both strokes and heart attacks and, perhaps, the other more recently described adverse effects of our high salt intake.

Salt is not the only factor in the diet that causes underlying vascular disease which results in strokes and heart attacks and it is important to combine it with a reduction in saturated fat intake and an increase in fruit and vegetable consumption. If these three dietary changes were put into practice in the United Kingdom there would be a major health benefit. Bakers can play an important role in improving the UK diet.

Addendum

Subsequent to this talk, in addition to ASDA, Marks & Spencer, Co-op, Iceland, Safeway, Sainsbury have announced salt reduction programmes for nearly all of their products including bread. More recently, the Federation of Bakers and the British Retail Consortium announced that they were going to reduce the salt concentration of bread across the board by 10%. These encouraging moves are a

start and need to be followed by further reductions over the course of the next few years.

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