

Salt fluoridation in Germany since 1991

Summary

Since 1991, fluoridated salt has been on sale in household-size packages in Germany. Potassium or sodium fluoride is added to iodized salt until the fluoride concentration reaches 250 mg/kg. The use of fluoridated salt to prevent caries is officially recommended by the Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde (DGZMK) and several other associations and groups interested in public health. In the course of the past thirteen years, the market share of fluoridated and iodized domestic salt rose to 63.1% in Germany. However, this positive development must not obscure the fact that fluoridated and iodized salt is still not allowed to be used in restaurant or cafeteria kitchens. This restriction now needs to be revoked in view of the fact that many children, adolescents and adults take their main meals in cafeterias or restaurants. Scientific studies have demonstrated beyond doubt that using fluoridated and iodized salt in cafeteria kitchens poses no problem whatever.

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General conditions regarding fluoridated salt

Since 1991, it has been legal to sell fluoridated salt in Germany. The necessary official approval was granted by the German Ministry of Health in 1991. At first, this permission did not include the right to produce fluoridated salt in Germany. Therefore fluoridated salt was imported from France and, starting in August 1991, sold in German grocery stores. Not until 1992 did the Ger-

man Ministry of Health approve the manufacture of fluoridated salt in Germany. On December 18, 1992, the first German salt refinery started to produce iodized salt with fluoride (FRIEL 1993). Since January 1, 1993, fluoridated salt made in Germany has been on sale in German grocery stores and supermarkets. Within a short time, all German salt manufactures began to produce fluoridated iodized salt. Owing to changes in the business environment in the past few years, there are now only two companies which produce salt in Germany in 2005: Südsalz in Munich and Bad Reichenhall, and esco – European salt company GmbH & Co. KG in Hannover. Among other kinds of salt, both companies produce fluoridated and iodized salt. Apart from the brand-name salts of these companies, a number of other trademarks are available in the food trade. Each trade group sells at least one fluoridated salt.

Fluoridated salt can be sold in Germany in 500-gram household packages (domestic salt) on sale in grocery stores and supermarkets, but must not be supplied in large packages or bags, as are used in bakeries, by the food industry or in institutional or commercial kitchens such as those in cafeterias and restaurants.

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Moreover, neither the food industry nor the bakeries in Germany are allowed to use fluoridated salt for their products. Since 1998, fluoridated salt may be used in restaurant and cafeteria kitchens with a special permit which is only issued with a large number of conditions attached. One of the few institutions, in fact the best known, which has obtained this permit is the staff cafeteria in the University Medical and Dental School in Heidelberg (SCHULTE 2003). Here, fluoridated and iodized salt has been used in the preparation of meals without any problems and without interruption since 1999.

Fluoridated salt is allowed to contain either potassium or sodium fluoride in a concentration of 250 mg per kilogram. During the early years of fluoridated salt production in Germany, manufacturers generally added potassium fluoride to their salt. For the past few years, fluoridated salt in Germany has contained sodium fluoride exclusively.

As far as the addition of iodine to table salt is concerned, food laws in Germany prescribe the following guidelines: in iodized salt, the iodine content must amount to between 15 and 25 mg/kg. As a rule, German salt producers add 20 mg of iodine per kilogram to their salt. Iodized salt is allowed to be used throughout the food chain, that is, by households or catering services, in industrially processed food or food made by small shops, and in semi-prepared or ready-to-serve meals.

Market share of fluoridated salt

In 1991, the Information Office for Caries Prevention of the "Deutscher Arbeitskreis für Zahnheilkunde" (DAZ, German Working Group for Dentistry) was founded in Gross-Gerau. To promote caries prevention, this group carries out extensive information campaigns which stress the importance of fluoridated salt. For this reason, it also systematically collects information related to fluoridated salt and publishes data on the sale of iodized salt and fluoridated iodized salt each year. In Germany, a steady rise in the market share of fluoridated salt was observed between 1991 and

the end of 2004, finally reaching 63.1% (Fig. 1). This figure must be understood as an average for the entire country, but there are great regional differences in the distribution of fluoridated salt. Unfortunately, no such detailed official figures are available.

However, the large market share of fluoridated and iodized salt in Germany must not obscure the fact that its potential for preventing caries is far from being fully exploited. This is because iodized salt with fluoride, in contrast to salt that is only iodized, may not be used in institutional or commercial kitchens and bakeries. Every day in Germany, institutional or commercial kitchens prepare the main meal for several million working adults. Moreover, sales of ready-to-serve meals, in which fluoridated salt is also prohibited, have risen rapidly in recent years. A few years ago the German school system began to undergo changes which are still ongoing and which provide children and adolescents less and less opportunity to benefit from fluoridated salt. For many years, children and adolescents in the German school system normally have attended classes only in the mornings and returned home at noon to eat their main daily meal. Now, however, more and more all-day schools are being set up and even kindergarten children increasingly stay away from home into the afternoon. The effect of these developments is that children and adolescents very often eat their main meal at school or kindergarten (SCHULTE 2003).

Endorsement of fluoridated salt

As early as two years after fluoridated salt became available in Germany, the Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde (DGZMK), the central scientific association for dentistry in Germany, published a recommendation advocating the use of fluoridated salt to prevent caries (GÜLZOW et al. 1993). This recommendation was also retained in the considerably revised version of this statement (GÜLZOW et al. 2000). In another statement, the DGZMK pointed out that fluoridating salt was a very widely effective and low-cost way to prevent caries. In ad-

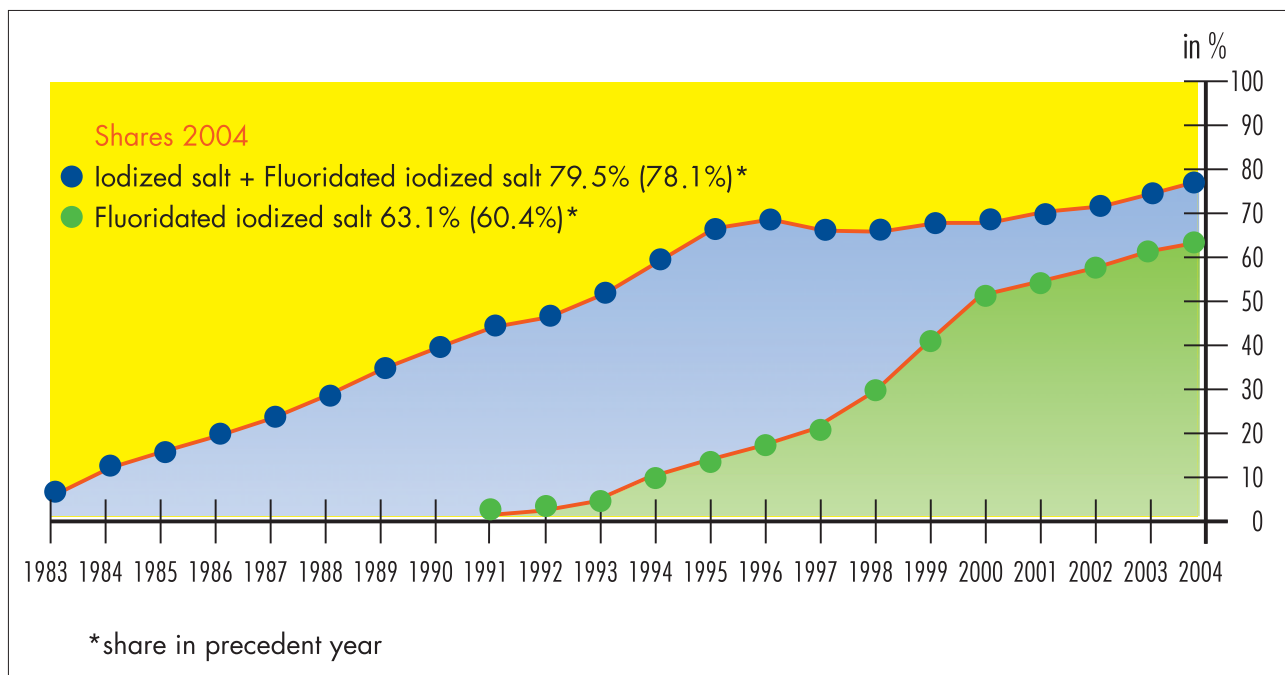


Fig. 1 Development of the market shares of iodized salt and fluoridated and iodized salt in Germany with respect to the total sale of salt in household packages

dition, it reaches people who may be missed by other caries prevention measures (HELLWIG & HETZER 2001). The Deutsche Gesellschaft für Ernährung (DGE, German Nutrition Society) also considers fluoridated salt to be effective in caries prevention (HOFMANN 2004). Furthermore, the Bundesinstitut für Risikobewertung (BfR, Federal Institute for Risk Assessment) advocates adding fluoride to salt; at the same time, the BfR objects to the use of fluoride in food supplements (GROSSKLAUS & PRZYREMBEL 2004).

A number of professional articles for dentists, dental assistants and pediatricians in Germany have pointed out the advantages of fluoridated salt in preventing caries (HETZER 1991, FRIEL 1993, BERGMANN & MANZ 1994, HETZER 1997, HELLWIG 1998, SCHULTE 2000, 2002 & 2003).

Fluoridated salt in epidemiological and public health studies

Epidemiological studies of caries in Germany have hitherto only rarely investigated whether there is a connection between low caries prevalence and the use of fluoridated salt. In one study conducted in 1998 among twelve-year-old children in Heidelberg, 38.8% of them stated that fluoridated salt was used in their families (SCHULTE et al. 2001). These children's average DMFT score, a measure of caries experience, was 1.32 and thus lower by a statistically significant margin than the score of 1.71 observed in children whose families did not use fluoridated salt.

One large-scale epidemiological study of caries showed that caries prevalence among children in German is dropping sharply. For instance, the average DMFT score of twelve-year-olds fell from 2.44 in 1994 to 1.24 in 2000 (PIEPER & SCHULTE 2004). During this period, the effects of several developments taking place in Germany helped to reduce caries. For one thing, the number of individual and group preventive measures and the application of fissure sealant increased substantially. Moreover, as mentioned above, the market share of fluoridated salt rose rapidly. There is no evidence, however, indicating that sales of fluoridated toothpaste also increased during this period. The market share of fluoridated toothpaste in Germany has been at least 90% for many years. Since these developments paralleled each other, it is not possible to carry out a retrospective evaluation of the relative effects of the various measures in terms of caries prevention.

In the years 2002 and 2003, a public health project to promote the use of fluoridated salt among immigrants was conducted in a region of southern Germany (VAN STEENKISTE & TUKA, 2005). This project succeeded to increase the proportion of Turkish stores offering fluoridated salt in this region from 29% to 86%.

Fluoridated salt and fluoride excretion among children

One study determined amounts of urinary fluoride excretion in three groups of children aged three to fifteen in northern Hessen. The children either took fluoride tablets or used fluoridated salt at home (SCHULTE et al. 1995). The average urinary fluoride excretion of children who took fluoride tablets was 484 µg/24 h, and 298 µg/24 h for children who used fluoridated salt at home, while this figure in the control group (children without fluoride tablets or fluoridated salt) amounted to 269 µg/24 h (SCHULTE et al. 1995). Later, the reason for the relatively high level of urinary fluoride excretion in the control group was discovered to be the fact that many of these children drank mineral water with a high fluoride content. This finding caused a detailed study on the fluoride

content in German mineral waters. Indeed, a number of common mineral waters have a high fluoride content (SCHULTE et al. 1996). This is why it is absolutely necessary to take the consumption of mineral water into consideration when fluoride excretion is being studied.

A study of kindergarten children in Dresden investigated how their fluoride excretion changed when they stopped taking fluoride tablets and instead began eating home meals prepared with fluoridated salt (HETZER et al. 1994). The children ate their main daily meal at noon in the kindergarten, made with non-fluoridated salt. The urine was collected on weekdays but not on weekends. When the study began, Group 1 stopped taking fluoride tablets, and fluoridated salt was used for their home meals. Children who previously had not taken fluoride tablets (Group 2) also began to eat home meals prepared with fluoridated salt (HETZER et al. 1994). Before the beginning of the study, the average fluoride excretion amounted to 341 µg/24 h (Group 1) and 188 µg/24 h (Group 2). As early as one month after the start of the study, the fluoride excretion of the two groups began to level, the average fluoride excretion amounting to 217 µg/24 h in Group 1 and 224 µg/24 h in Group 2.

Another study of kindergarten children in Dresden used the same design with the difference (HETZER et al. 1996) that the children began to eat a main daily meal in the kindergarten prepared using fluoridated salt. As in the previous study the urine was collected on weekdays in three fractions (at night, in the morning and at noon). Before this second study started, the average fluoride excretion amounted to 323 µg/24 h in Group 1 and 194 µg/24 h in Group 2. Then, a significant rise in the average fluoride excretion was observed in both groups. Six months after the study began, for instance, it amounted to 564 µg/24 h in Group 1 and 505 µg/24 h in Group 2. The increase in fluoride excretion was mainly observed in the afternoon, after the children had eaten their main daily meal prepared with fluoridated salt. The authors concluded from the two studies that using fluoridated salt can be considered to be an alternative to taking fluoride tablets. However, all meals, both at home as well as in the kindergarten, must be prepared with fluoridated salt. Otherwise, the children's fluoride intake would be below the optimum level.

Fluoridated salt and fluoride excretion among adults

When the staff cafeteria of the university medical and dental school in Heidelberg (VZMH) began to use fluoridated salt, an accompanying scientific study was conducted which lasted three years (SCHULTE et al. 2001 & 2002, SCHULTE 2003). Two hundred test persons participated and regularly ate their main daily meal in this cafeteria (test group). The control group consisted of sixty persons who never ate meals in this cafeteria. After fluoridated salt was introduced to the VZMH, a substantially higher urinary fluoride excretion was detected in the test group in the afternoon after the main meal had been eaten. On average, it rose from 33.9 µg/h to 42.9 µg/h, which corresponds to an average increase of 26.5%. Since the test group showed no rise in average urinary fluoride excretion in the morning or evening/night, the increase in average urinary fluoride excretion over 24 hours was considerably less, amounting to only 11.1%. In the control group, the daily rate of urinary fluoride excretion remained quite constant throughout the course of the study. It amounted to 32.6 µg/h in the afternoon at the base line examination and averaged 30.8 µg/h at subsequent examinations. The average fluoride concentration in the test and control groups did not differ before

and after fluoridated salt was introduced to the VZMH. Hence the average fluoride concentration in the 24-h urine of both groups based on all subsequent examinations amounted to 0.48 mg/liter. This is why the authors concluded that using fluoridated salt in institutional or commercial kitchens poses no problems and should be generally permitted in the interest of preventing caries.

Conclusions

Fluoridated salt has now become firmly established in Germany. Of all the various salt products, fluoridated and iodized salt now has the largest share of the market. Switzerland is the only European country in which fluoridated salt enjoys a higher market share than in Germany. There is an urgent need to allow fluoridated salt to be used in institutional and commercial kitchens, cafeterias and restaurants. Fluoridated salt is recommended by the Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde (DGZMK) and several other associations and groups interested in public health. It would be highly beneficial if more scientific studies on fluoridated salt were to be conducted in Germany.

Zusammenfassung

Seit 1991 wird in Deutschland fluoridiertes Jodsalz in Haushaltspackungen verkauft. Dem Jodsalz wird so viel Kalium-Fluorid oder Natrium-Fluorid zugesetzt, dass die Fluoridkonzentration 250 mg/kg Salz beträgt. Die Verwendung von fluoridiertem Speisesalz aus kariesprophylaktischen Gründen wird offiziell von der Deutschen Gesellschaft für Zahn-, Mund- und Kieferheilkunde (DGZMK) und mehreren an der öffentlichen Gesundheit interessierten Verbänden und Gremien empfohlen. Im Verlauf von 13 Jahren stieg der Marktanteil von fluoridiertem Jodsalz in Deutschland auf 63,1%. Diese positive Entwicklung darf jedoch nicht darüber hinwegtäuschen, dass fluoridiertes Jodsalz in Deutschland bisher nicht in den Küchen von Restaurants oder Kantinen verwendet werden darf. Diese Restriktion sollte in Anbetracht der Tatsache, dass viele Kinder, Jugendliche und Erwachsene einen Grossteil ihrer warmen Hauptmahlzeiten in Kantinen oder Restaurants einnehmen müssen, aufgehoben werden. Wissenschaftliche Untersuchungen haben eindeutig gezeigt, dass die Verwendung von fluoridiertem Jodsalz auch in Küchen von Kantinen problemlos möglich ist.

Résumé

En Allemagne, le sel fluoré se vend dans les magasins et supermarchés depuis 1991. On ajoute du fluorure de sodium ou de potassium au sel iodé jusqu'à ce que l'on obtienne une concentration en fluor de 250 mg/kg.

L'utilisation du sel de table fluoré pour la prévention de la carie est préconisée par la «Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde» (DGZMK, association allemande d'odontologie), ainsi que par d'autres associations et fédérations qui s'intéressent à la santé publique.

La part du marché du sel fluoré a atteint 63,1% en 13 ans. Néanmoins, cette évolution positive ne doit pas faire oublier le fait que le sel fluoré et iodé n'est pas utilisé dans les cuisines de restaurants ou de cantines. Cette restriction devrait être levée, car de plus en plus d'enfants, d'adolescents et d'adultes sont obligés de prendre une majeure partie de leurs repas chauds dans les restaurants ou dans les cantines. Des études scientifiques ont démontré de manière évidente que l'utilisation de sel fluoré et iodé au sein des cuisines de cantines peut se faire sans aucun problème.

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