

SALT FLUORIDATION: AN EFFECTIVE AND SAFE MEASURE TO STOP TOOTH DECAY IN NEPAL

Oral Health Focal Point
Ministry of Health
HMG Nepal

One of the essential components in the prevention of dental caries (dental decay) is the use of fluorides. In fact, the use of fluorides is recognised as one of the most successful measures in the prevention of disease in the history of public health. Dental caries is a disease that has been with mankind throughout history and continues to have a major effect on the physical, social, psychological and economic health of people worldwide. In industrialised countries the disease peaked in the 1970's when the average 12-year-old child had as many as 10-15 decayed, missing or filled teeth. Thereafter, over the past 30 years, the disease declined dramatically in high income countries while increasing in some emerging market economies such as Nepal, India, China, and Bangladesh. Countries with declining prevalence of dental caries have a large proportion of the population living in communities exposed to optimum levels of fluoride in their drinking water (e.g. USA, Canada, Australia, Hong Kong, Singapore), or consume salt iodised and fluoridated in appropriate concentrations (e.g. Switzerland, France, Jamaica, Costa Rica and many other Central and South American Countries) or nearly the entire population routinely brushing with fluoridated toothpaste (e.g. England, Finland, Sweden). The people of many of these countries use fluoridated toothpaste and are also exposed to either water fluoridation or salt fluoridation as well. Studies have shown that the combined use of fluoride in various vehicles (water, salt, toothpaste, milk) has an additive effect on the making the teeth more resistant to decay and in remineralisation (healing) of initial decay of tooth enamel.

The primary effect of fluorides is topical through the direct contact of fluoride (e.g. fluoridated toothpaste) with the teeth which makes the teeth more resistant to decay. Brushing of the teeth without a fluoridated toothpaste has not been shown to be an effective preventive method. Toothpaste fluoridated to an optimum level of 1000 parts per million (ppm) of fluoride and used twice a day, after the morning meal and before going to bed (twice a day) has been proven to be effective in the prevention of caries.

Fluoride works best to prevent caries when a constant ambient level of fluoride is maintained in the oral cavity. Both water fluoridation and salt fluoridation work systemically and topically. When fluoridated water and salt is ingested, the fluoride is absorbed and circulated through blood serum to the developing teeth and is also incorporated into the saliva which bathes the teeth. Before the permanent teeth erupt in the mouth, fluoride ingested through fluoridated water or salt, is incorporated into the developing teeth making them more resistant to the acid produced by bacteria in the mouth when sugar is consumed. The optimum level of fluoride in water has been determined to be between 0.7 to 1.2 ppm of fluoride and in salt it is 200 to 250 ppm of fluoride.

Other than the use of fluoridated toothpaste, the fluoridation of community water supplies or the fluoridation of salt are the most practical public health measures for the prevention of dental caries in a community or nation. Some key attributes of

water and salt fluoridation are:

- **Inexpensive:** Water fluoridation averages US\$ 0.50 (~40 NRs.) per person per year while salt fluoridation averages US\$ 0.06 (~4.5 NRs.) per person per year.
- **Effective:** Scientific evidence is available which proves the effectiveness of both methods in the reduction of dental caries in all ages. Benefits continue for a lifetime if consumption continues.
- **Safe:** When fluoridated to the recommended levels ingested fluoride has no ill effects on general health. In order for an adult to suffer from acute toxicity from water fluoridated at 1 ppm, 800 litres of water would have to be consumed at one sitting or 5 kg. of salt fluoridated at 250 ppm of fluoride would have to be consumed. For severe dental fluorosis and mild skeletal fluorosis to occur, a person would have to consume water fluoridated between 3-8 ppm of fluoride or more for a period of 15-20 years or more. Iodine and fluoride can be safely combined in salt. Fluoridation and iodisation can be performed at the same time using the same equipment.
- **Equitable:** Entire populations benefit. Water fluoridation favours urban populations with good infrastructure while salt fluoridation favours both urban and rural populations. Milk and juice can also be fluoridated but only the segment of the population who drink processed milk or juice benefit.
- **Requires no change in behaviour:** Little or no conscious action is required of the public in order to benefit from fluoridated water and salt.
- **Does not depend on professional services:** Professionally applied fluoride agents depend on trained personnel to deliver one-to-one treatments which make these agents expensive

and unaffordable to large portions of the population.

Reduces the cost of dental treatment: Treating teeth for dental caries is the most expensive part of the body to treat in terms of direct costs. It is not only expensive for government health systems but also expensive for families. The estimated cost to treat an average 6-year-old child with 3 decayed teeth is 800 NRs. not including lost wages, travel and accommodation. This is equal to enough money for food for a month.

Excessive consumption of fluoride may lead to dental fluorosis in children. Dental fluorosis is hypomineralisation of the enamel of the teeth caused by chronic ingestion of excessive fluoride during the period when the teeth are forming in the jaw. Mild fluorosis is characterised by white spots or opacities on the teeth. It does not affect the health of the teeth or children but when fluorosis is severe, it may be a cosmetic concern. Most fluorosis is not severe, except in isolated areas of India, Thailand, and some African countries such as Tanzania and Kenya where there is excessive fluoride in the drinking water.

The situation concerning the oral health of the people of Nepal warrants serious consideration of salt fluoridation as a public health measure. Analysis of epidemiological data shows that over the last two decades, the prevalence and severity of dental caries in children and adults is doubling every ten years in Nepal. In fact, untreated dental caries is the most prevalent childhood disease, more prevalent than malnutrition and Vitamin A deficiency. Approximately 65% of the children at age 6 years have more than 3 decayed teeth. In the context of poverty, malnutrition and poor oral hygiene, untreated dental caries can lead to abscesses of the head and neck. The problem of increasing dental caries is mainly due to increased sugar consumption amongst the population. The per capita sugar

consumption has tripled to more than 6 kg. per person per year and sugar production cannot keep up with public demand for sugar. This is not good for oral health since the concentration of fluoride, which is a naturally occurring substance in the environment, is very low in the drinking water throughout Nepal. More than 800 samples of water were collected from all parts of Nepal and analysed for the fluoride content. The majority of the samples had less than 0.1 ppm fluoride and only 3 samples were determined to have efficacious levels, between 0.9-1.0 ppm fluoride. Although fluoridated toothpaste is now more readily available the last two years, there are many disadvantaged communities in Nepal where the use of toothpaste is not a social norm. A recent survey of school children in urban schools shows that approximately 65-70% used fluoridated toothpaste but only once a day. This is generally true of the general population with rural residents brushing even less often and brushing without fluoridated toothpaste.

Restoring decayed teeth is not a preventive method since fillings do not prevent the onset of the disease. Even if this was a rational option, Nepal cannot hope to treat away disease with limited manpower. Nepal has approximately 300 registered dentists and 90% of them work and live in Kathmandu. Producing more dentists is not an adequate option since dentists wish to work in urban areas where they can use their skills and make a good income for the years and money they spent in dental school. Since 85% of Nepal's population live in rural areas, this segment of the population has poor access to oral health care.

Considering the low fluoride levels in water; increasing caries and sugar consumption; high cost of the treatment and inadequate manpower to treat dental caries; dental professionals and stakeholders of oral health met at the "Second Workshop to Develop a National Strategic Plan for Oral Health for Nepal" on December 12 and 13, 2002 and unanimously agreed to adopt and implement cost-

effective public health measures to prevent dental caries. Due to poor infrastructure and a large rural population, water fluoridation was considered not to be a suitable option for Nepal. On the other hand, salt fluoridation was considered to be a very cost-effective and appropriate option. 99% of the population consume salt and it is used daily by rich and poor, as well as urban and rural populations. More than 90% of the salt consumed in Nepal is imported through the Salt Trading Company of Nepal from India where the salt is iodised. Since the salt is iodised especially for Nepal, fluoride can be added during the iodisation process for Nepalese consumption without affecting consumers in India.

The newly formed Oral Health Focal Point, Ministry of Health, HMG Nepal will conduct baseline studies on the prevalence and severity of dental caries in children and adults, prevalence and severity of fluorosis in the permanent incisor teeth of children, and fluoride concentration in urine samples. The information gathered will allow for regular monitoring of reductions in the prevalence of dental caries and prevalence of fluorosis against baseline levels. The findings may lead to adjustments in the concentration of fluoride added to salt. Fluoride concentration of imported salt will also be assessed on a regular basis in order to ensure adequate efficacious and safe levels of fluoride.

There is overwhelming agreement among the scientific, dental/medical community worldwide that fluoridation of salt is a safe and effective public health measure. More than 30 countries worldwide have established salt fluoridation programmes or have salt fluoridation programmes in progress in combination with iodisation of salt. It is time for everyone concerned in Nepal, the dental/medical community and the politicians to seriously move towards the implementation of salt fluoridation as salt is the cheapest and most readily available vehicle to make fluoride available to the majority of the population including the most disadvantaged.