DENTAL HEALTH IN CANADA*

PROFESSOR ARTHUR W. E. ERIKSSON

University of Alberta, Edmonton, Alberta, Canada

Dental Health in Canada is a very broad topic. In view of this fact it is proposed to give some figures to show dental conditions in children and the relationship of the number of dentists, dental hygienists and dental assistants to population and then devote most of the paper to "fluoridation of public water supplies."

A survey report by D. W. Lewis (5) presented in April 1, 1968 is used as a basis for the estimates of dental health in children. Figures were secured from a five province sample (British Columbia, Alberta, Saskatchewan, Ontario and Nova Scotia) out of the total of 10.

In the age range 5–13 years no caries defects were found in 28.68% of the children. The average number of teeth needing restoration was deciduous, 5–9 age range, 2.14%; permanent ages 7–13, 1.95; and deciduous and permanent age, 5–13 was 2.84. In the 5–9 age group 5.23 defective teeth were found on the average. Decayed missing and filled teeth in the 7–13 age group was 3.71. Poor oral hygiene was found in 45.54% of the children 5–13. Abnormal gingiva in the 5–13 age group were found in 30.22%. Abnormal occlusion was worse with 57.76% of the children showing this condition. The above figures included those from fluoridated areas.

There was a total of 6713 licensed dentists in Canada on 1 January 1968. Of these, 6582 (98%) were men and 131 (2%) women. During 1967 there was a loss of 230 dentists and a gain of 411 which gives a net gain of 181 or 2.7%. The absolute increase of dentists from 1958 to 1968 was 1,149 or 20.7%. There are 3,039 Canadians for each dentist. The number of dentists per 10,000 population is 3.3.

Dentists limiting their practices to a specialty are 347 in number or 5.3%. This leaves 6,366 (94.7%) that are not specialists.

There are 376 dental hygienists with a proportion of one hygienist to 18 dentists. This allows one hygienist for each 54,269 persons.

Full time dental assistants are 5,500 or one for each 1.2 dentists. There are 1400 part-time dental assistants.

The 1950–51 Canada Sickness Survey showed that 75% of the families studied did not visit a dentist during that year and yet dentists were busy. There have never been enough dentists or paradental helpers. The obvious solutions are: qualify more dentists, make the present dentists more efficient and have their helpers take over more of their work.

How does fluoride get into the water? When water comes in contact with soils and rocks some of the substances in these are dissolved. Later the water emerges in lakes, rivers and wells. If the water had passed through a rock phosphate bed, calcium phosphate and calcium fluoride would be present in it. The calcium fluoride in dilute solution is completely ionized. The concentrations are expressed on the basis of the number of parts of the substance in one million parts of water and are written p.p.m.

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Fluorides in natural waters vary in fluoride ion concentration from less than 0.1 p.p.m. to 14 p.p.m.

There is considerable fluorine content in vegetable foods, tea contains 30 to 60 p.p.m., whole wheat flour 1.3, apples, 0.8 and oranges 0.2. The amount of fluorine in animal foods is: milk 0.1 to 0.2, cheese 1.6, chicken 1.4, oysters 1.5, canned salmon 8.5, and canned sardines up to 12.5 p.p.m.

When animals drink water or eat foods of vegetable or animal origin most of the fluorine in these is excreted chiefly in the urine. Some fluorine enters the bones and teeth. This is particularly true in young animals, as it takes place when the teeth are forming and the bones are developing. The fluorine remains in the organic form. There is no accumulation of fluorine in specific organs or glands.

There is considerable variation in the fluorine content of water supplies and in the amount of fluoride ingested by people in different communities. When the fluorine content of water is 1 p.p.m. or greater, some of the children may have teeth that are mottled. This dental fluorosis may be mild or severe depending on the concentration of fluorine in the water

Millions of people in the world drink water with a fluorine content of 1 p.p.m. or greater. Their teeth are mottled to a greater or lesser degree. Mottled teeth are structurally strong and less liable to be affected by dental caries than normal teeth. In various places the fluorine content of water was brought up to 1 p.p.m. and it was found that the reduction of caries was great and the chances of mottling was at a minimum.

One such experiment was the Brantford Fluoridation caries study (1). The fluorine content of the Brantford, Ontario, water has been continuously adjusted to 1 p.p.m. since 1945. Stratford water contained natural fluoride to the amount of 1.6 p.p.m. In Sarnia there was a negligible amount of fluoride.

The teeth of the children in these three areas were regularly examined from 1945–1963 when the 16 and 17 year old children had reached school leaving age. A final examination was made in 1963 after 17½ years of fluoridation at Brantford.

The examination was made by Dr. H. N. Brown who had done the examinations through the years. All 16–18 year old children, who were native and had continuously resided in each city were included in the study. There were the following numbers of children: Sarnia 482, Brantford 356 and Stratford 227.

The results are summarized as follows:

1. Percentage of children having no permanent tooth caries experience. There is a highly significant difference between Sarnia and Brantford and Stratford, in favor of the last two. There is no significant difference between the last two.
2. Mean tooth mortality is considerably higher in Sarnia than in Brantford and Stratford. There is no significant difference between the latter two cities.
3. Mean DMF permanent teeth. A highly significant difference is found between Sarnia and the two fluoridated areas. There is no significant difference between Brantford and Stratford.
4. Upper permanent incisors—children in Sarnia much worse than in Brantford and Stratford.
5. No case of unsightly mottling was obvious among the children examined in Brantford and Stratford.

6. Medical effects of water fluoridation. No ill-effects attributable to the presence of fluoride in the water supply was observed by the examiner, by the health authorities or by the practising physicians in Brantford and Stratford.
7. After the introduction of water fluoridation in Brantford there has been a continuous reduction in caries experience in children.
8. There is essentially no difference in caries reducing effect between a mechanically fluoridated water supply and a naturally fluoridated water supply and this beneficial effect of water fluoridation extends at least until the eighteenth year of life.
9. Overall tooth decay rates in cities with water supplies adjusted to about 1 p.p.m. fluorides was decreased about 65%.
10. The cost of fluoridation was found to be about 10¢ per person per year.

Fluoridation is the adjustment of the level of a substance that is already in the water not the addition of a new substance.

Endorsement of fluoridation has been given by the Canadian Medical Association, the Canadian Dental Association, the Government of Canada's Dominion Health Council, the Royal Commission on Health Services (the Hall Commission), Canadian Public Health Association, and a great many others.

Two committee reports are mentioned. The first is the Fluoridation Committee of Alberta (4) which in 1961 resolved "That this committee gives its unqualified endorsation of the principle of the addition of soluble fluorides to fluoride-deficient public water supplies in Alberta to bring the fluoride concentration up to 1 part per million fluorine." The other is that done in the Province of Ontario (8). It is the most comprehensive report produced in Canada.

The Edmonton Fluoridation Survey (2) reported the following results:

1. There is a relationship between socio-economic level and dental health in Edmonton. Children from middle and high socio-economic groups have better dental care than children from low socio-economic groups.

2. Voters who live in areas of the city where the dental health of school children is poorest registered an average vote of 52% against fluoridation in three plebiscites. Where the middle and high socio-economic groups of children live, the average vote in the three plebiscites was 65% and 78% respectively in favor of fluoridation.

3. Where voter support for fluoridation is low there is also a low turn-out of voters. These voters also consistently registered the lowest votes in favour of money by-laws in all of eighteen plebiscites held at the time of fluoridation plebiscites. This suggests that financial considerations play a major role in all plebiscites. However, there was a much higher differential (17%) between low and middle socio-economic groups of voters in the fluoridation vote than for the money by-laws (10% average in 18 plebiscites). This suggests the possibility that anti-fluoridation propaganda is most effective in influencing voters in low socio-economic groups to vote against fluoridation or that, conversely, pro fluoridation propaganda is more effective in influencing voters in middle and high socio-economic groups to vote in favour of the measure.

What was the status of fluoridation in Canada 1, January, 1968? (3).

Some major centers using controlled fluoridation were: Toronto, Ontario; Winnipeg, Manitoba; Edmonton, Alberta; Ottawa, Ontario;

Hamilton, Ontario; London, Ontario; Windsor, Ontario; Laval, Quebec; Halifax, Nova Scotia and Saskatoon, Saskatchewan.

There was a total of 251 fluoride-adjusted water systems in Canada supplying 315 communities and serving 6,063,690 people. This was 29.7% of population and 41.8% of population in piped water areas.

Natural occurring fluoridation was found in 195 water systems supplying 144 communities and serving 197,021 persons. This was 1% of population and 1.3% of population of piped water areas.

This gives a total of 446 water systems supplying 459 communities and 6,260,711 persons.

The population of Canada was about 20,405,000 and the population on piped drinking water systems was 14,513,500.

All provinces have provided legislation to permit fluoridation. Six provinces, Nova Scotia, New Brunswick, Quebec, Ontario, Newfoundland and Manitoba allow fluoridation without plebiscite or on local option. Ontario has a clause allowing 10% of voters to petition for a plebiscite. Three provinces require plebiscites, Saskatchewan, Alberta, British Columbia. Prince Edward Island passed special legislation to permit a plebiscite in Charlottetown.

What about fluoride tablets?

It has been suggested that fluoride could be administered individually. The Province of Alberta, has amended its Public Health Act to read:

> The Minister may provide to any health unit or to the health department of a municipality, fluoride in tablet form for distribution without charge to any person
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> a) who is resident within the boundaries of the health unit or municipality as the case may be, and
> b) requests it, and
> c) whose physician or dentist has prescribed it for the person or his dependents.

The Province of Saskatchewan had an extensive program of this type for many years but phased it out in January, 1967 as it was not being used.

Two out of three Calgarians have been found to not bother to get free fluoride supplement prescriptions refilled.

Objections are:

1. The community cost would be about ten times as high as fluoridation.
2. It is impractical as it is difficult for the most cooperative parent and almost impossible in low income groups where parents concern for dental problems is often not great.
3. There is lack of conclusive proof of effectiveness.

What about fluoridation and the adult citizen?

People have said that fluoridation is only of value for children. There is now reasonably good evidence that fluoridation helps prevent brittle bones (senile osteoporosis) in older adults. Democracies try to introduce public health advances for the relief of human suffering so fluoridation should not be carried out just because adults obtain no *dental* benefit.

Canada has also had opposition to fluoridation of the public water supply. When the Government of Alberta began to prepare a law governing the fluoridation of water supplies, an organization calling itself the

Pure Water Association appeared. Local literature (7) and locally printed literature that probably originated in the United States was distributed before plebiscites. Speakers like Dr. Exner appeared in the area.

All reputable research supports the fact that fluoridation is safe, effective and inexpensive.

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