

Editorial

Need to put children's oral health first in Israeli debate on water fluoridation

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A possible dental public health crisis is looming in Israel. How can this be? As many as 70% of the Israeli population are currently supplied with optimally fluoridated water and oral health studies carried out in Israel over the past decade have demonstrated the benefits.

For example, a national study of Israeli 12-year olds in 2002 (Zusman *et al.*, 2005) found an average DMFT of 1.39 in fluoridated areas compared with 1.83 in non-fluoridated ones. The national mean DMFT, in this study, was 1.66. Ten years later, in 2011/12, a study (yet unpublished) of 12-year olds by Jerusalem's Hebrew University-Hadassah Dental School (commissioned and financed by the Israeli Ministry of Health) reported an average national DMFT of 1.17. This decline was predominantly attributed to water fluoridation and the use of fluoride dentifrices.

The recent study found a DMFT level of 0.98 among 12-year olds residing in fluoridated cities compared with 1.38 among those residing in non-fluoridated cities (statistically significant). It also showed a marked effect of fluoridation on the inequalities caused by socio-economic position (SEP). Among children residing in non-fluoridated areas, a level of 1.52 DMFT was found among low SEP groups, compared with 1.20 DMFT in higher SEP groups. This gap was almost eliminated in fluoridated areas: 1.01 DMFT among low SEP groups, compared with 0.97 among higher SEP groups. Additionally, the study revealed (in a multiple logistic regression model that considered ethnic group, health behaviour, SEP and other independent variables) that children residing in fluoridated areas had twice the chance of being caries-free than children in non-fluoridated areas (OR=2.11). In comparison with other countries, the study found low levels of dental fluorosis.

Yet, despite these fluoridation success stories, this important public health measure could be under threat following the decision of a new Health Minister *not* to renew regulations that require the national water company, Mekorot, to fluoridate water supplied to all Israeli communities with more than 5,000 people. Some internet-based reports claiming that Israel's Supreme Court has banned fluoridation are wrong (Jerusalem Post, 2013a). The Court found no basis for doing so – whether in relation to anti-fluoridation allegations about efficacy or adverse effects. The decision *not* to renew the regulations was political, not judicial, and was taken by the Minister, not the Court.

The regulations, currently still in force, are due to expire in August 2014. After that, the picture looks somewhat blurred. In a 'worst case' scenario it is possible that *all* fluoridation may cease in Israel once Mekorot is no longer required by law to fluoridate, which would be bad news for children and families in cities such as Haifa, Jerusalem and Tel Aviv. More toothache, more caries, more restorations, more extractions and a decrease in quality of life are the likely consequences, especially among the lower SEP groups.

It is to be hoped that decisions about fluoridation in Israel will be driven by evidence-based oral health needs and a careful appraisal of the accumulated national and international evidence on the effectiveness of water fluoridation in addressing those needs. Oral health benefits have been identified by four systematic reviews (three focused on the dental benefits for children and one on adults) published since 2000.

The average reduction in tooth decay found by the York review (McDonagh *et al.*, 2000) has been quantified at around 40% (Worthington and Clarkson, 2003). A later US Task Force review (Truman *et al.*, 2002) found average reductions of between 30% and 50%. An Australian NHMRC review (2007) concurred that water fluoridation reduces the average number of decayed, missing and filled teeth per child and increases the percentage of children who are free from tooth decay. More recently, in 2012, an analysis of fluoridation studies published between 1990 and 2000 found that, on average, fluoridation reduces tooth decay in primary teeth by between 30% and 59% and in permanent teeth by between 40% and 49% (Rugg-Gunn and Do, 2012). An analysis by Griffin *et al.* (2007) of post-1979 studies showed water fluoridation to reduce dental caries by around 27% in adults with lifelong residence in fluoridated communities.

Nearly 70 years of water fluoridation (the first scheme commenced in Grand Rapids, Michigan, in 1945) (Lennon 2006) has shown that it is safe as well as beneficial. No scientifically credible evidence has emerged to suggest that fluoride occurring in water at a concentration of 1mg/L (one part per million) causes harm to people's health, not that it stops opponents continuing to make claims on the internet – with melodramatic banner headlines to match. In the modern world, someone somewhere can scream that X causes cancer or some other medical condition and, within the click of

a computer button, the story rushes from one continent to another like wildfire, however flimsy the basis for it.

Israel and many other countries have experienced this phenomenon, including the Irish Republic, which began implementing mandatory fluoridation in 1964 and where, in recent years, an independent Forum on Fluoridation was established by the Ministry of Health to assess the evidence on its benefits and safety and, in so doing, to address many of the claims being made by opponents. Published in 2002, the Forum's report concluded that water fluoridation had been very effective in improving oral health in Ireland, and that the best available and most reliable scientific evidence indicates that it does not adversely affect human health.

Writing in the *Journal of Dental Research*, leading Irish dental academics highlighted, Clarkson *et al.* (2003), a number of important epidemiological studies of the benefits of fluoridation for children and adults in their country (O'Mullane *et al.*, 1986; O'Mullane and Whelton, 1992; Blinkhorn *et al.*, 1992; Whelton *et al.*, 1998; 2001). They concluded that "the mandatory nature of the legislation for water fluoridation has ensured that a relatively large proportion of the population has received the benefits of this preventive measure". For dental public health specialists in Ireland, the support given by successive governments to water fluoridation has been very much appreciated. More recent studies in Ireland (Whelton *et al.*, 2004; 2006) confirm continued evidence of benefits and a recent vote in the Irish Parliament confirms continued political support (Irish Times, 2013).

In Israel, however, leading health professionals are aghast at the prospect that fluoridation could disappear in their country next year (Jerusalem Post, 2013b). The Israel Paediatrics Society has predicted that its loss would harm children's dental health and is campaigning for its retention. Professors Harold Sgan-Cohen and Jonathan Mann of the Hebrew University-Hadassah Dental School's Department of Community Dentistry have reiterated that fluoride in water is the most efficient, cheapest and safest measure of dental health promotion that reaches across the socio-economic spectrum. Israeli researchers had previously warned against the potential effect of the anti-fluoridation lobby (Vered *et al.*, 2002) despite repeated reports of declining caries in Israel attributed to water fluoridation (Sgan-Cohen *et al.*, 2009; Zusman *et al.*, 2005).

Whilst Israel may be about to move away from mandatory water fluoridation – essentially a political decision – there is a strong case for Israeli health professionals, local authorities and water suppliers working together to ensure that existing fluoridation schemes are protected and that new schemes are introduced wherever justified by the level of tooth decay and wherever such schemes are technically feasible. That, surely, would be the preferred outcome from a public health perspective.

References

- Blinkhorn, A.S., Attwood, D., Gavin, G. and O'Hickey, S. (1992): Joint epidemiological survey on dental health of 12-year old school children in Dublin and Glasgow. *Community Dentistry and Oral Epidemiology* **20**, 307-308.
- Clarkson, J., McLoughlin, J. and O'Hickey, S. (2003): Water fluoridation in Ireland – a success story. *Journal of Dental Research* **82**, 334-337.
- Forum on Fluoridation (2002): *Report of the Forum on Fluoridation*. Dublin: Stationery Office. www.dohc.ie/publications/pdf/fluoridation_forum.pdf?direct=1
- Griffin, S.O., Regnier, E., Griffin, P.M. and Huntley, V. (2007): Effectiveness of fluoride in preventing caries in adults. *Journal of Dental Research* **86**, 410-415.
- Irish Times (9th and 10th November 2013): *Proposal to stop fluoridation rejected*.
- Jerusalem Post (12th April 2013a): *New order drops water fluoridation requirement*.
- Jerusalem Post (24th April 2013b): *Academics rebuke Health Minister Yael German's decision to cancel mandatory adding of fluoride to drinking water*.
- Lennon, M.A. (2006): One in a Million: the first community trial of water fluoridation. *Bulletin of the World Health Organization* **84**, 759–760.
- McDonagh, M., Whiting, P., Bradley, M., Cooper, J., Sutton, A., Chestnutt, I., Cooper, J., Misso, K., Bradley, M., Treasure, E. and Kleijnen, J. (2000): *A systematic review of public water fluoridation*. York: Centre for Reviews and Dissemination, University of York.
- National Health and Medical Research Council (2007): *A systematic review of the efficacy and safety of fluoridation*. Canberra: Australian Government, NMHRC.
- O'Mullane, D.M. and Whelton, H. (1992): *Oral health of Irish adults 1989-90*. Dublin: Stationery Office.
- O'Mullane, D.M., Clarkson, J., Holland, T., O'Hickey S. and Whelton, H. (1986): *Children's dental health in Ireland 1986*. Dublin: Stationery Office.
- Rugg-Gunn, A.J. and Do, L. (2012): Effectiveness of water fluoridation in caries prevention. *Community Dentistry and Oral Epidemiology* **40** (Suppl. 2), 55-64.
- Sgan-Cohen, H.D., Amram-Liani, D. and Livny A. (2009): Changing dental caries levels in the 1980s, 1990s and 2005 among children of a Jerusalem region. *Community Dental Health* **26**, 62-64.
- Truman, B.I., Gooch, B.F., Sulemana, I., Gift, H.C., Horowitz, A.M., Evans Jr, C.A., Griffin, S.O. and Carande-Kulis, V.G., The Task Force on Community Preventive Services (2002): Reviews of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injuries. *American Journal of Preventive Medicine* **23**, 21-54.
- Vered, Y. and Sgan-Cohen, H.D. (2002): The fight over water fluoridation in Israel – potential modes of action in the light of the 'American experience'. *Journal of Public Health Dentistry* **62**, 67-69.
- Whelton, H., Crowley, E., O'Mullane, D., Donaldson, M., Kelleher, V. and Cronin, M. (2004): Dental caries and enamel fluorosis among the fluoridated and non-fluoridated populations in the Republic of Ireland in 2002. *Community Dental Health* **21**, 37-44.
- Whelton, H., Crowley, E., O'Mullane, D.M., Donaldson, M. and Kelleher, V. (2006): Dental caries and enamel fluorosis among the fluoridated population in the Republic of Ireland and non fluoridated population in Northern Ireland in 2002. *Community Dental Health* **23**, 37-43.
- Whelton, H., O'Mullane, D.M. and Cronin, M (1998): *Children's dental health in the Eastern Health Board Region 1997*. Dublin: Department of Health.
- Whelton, H., O'Mullane, D.M. and Cronin, M (2001): *Children's dental health in the North Western Health Board Region 1997*. Dublin: Department of Health.
- Worthington, H. and Clarkson, J. (2003): The evidence base for topical fluorides. *Community Dental Health* **20**, 74-76.
- Zusman, S.P., Ramon, T., Natapov, L. and Kooby, E. (2005): Dental health of 12-year-olds in Israel - 2002. *Community Dental Health* **22**, 175-179.