

Milk fluoridation for the prevention of dental caries



**World Health
Organization**

Milk fluoridation for the prevention of dental caries - 2009



WHO

Milk fluoridation for the prevention of dental caries

Editors

J Bánóczy, PE Petersen, AJ Rugg-Gunn



**World Health
Organization**

**Geneva
2009**

J Bánóczy, PE Petersen, AJ Rugg-Gunn (Editors). Milk fluoridation for the prevention of dental caries. World Health Organization, 2009.

1. Milk. 2. Fluoridation. 3. Oral health promotion. 4. Dental caries prevention

Authors: Jolan Bánóczy; Michael Edgar; Poul Erik Petersen; Andrew Rugg-Gunn; Alberto Villa; Margaret Woodward.

ISBN 978 92 4 154775 8

(NLM classification: QV 50)

© World Health Organization 2009

All rights reserved. Publications of the World Health Organization can be obtained from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel.: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int). Requests for permission to reproduce or translate WHO publications – whether for sale or for noncommercial distribution – should be addressed to WHO Press, at the above address (fax: +41 22 791 4806; e-mail: permissions@who.int).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

List of contributors

Jolán Bánóczy	Professor, Semmelweis University Budapest, Hungary.
Michael Edgar	Professor, University of Liverpool, UK.
Poul Erik Petersen	Responsible Officer for Oral Health, Department of Chronic Disease and Health Promotion, World Health Organization (WHO), Geneva.
Andrew Rugg-Gunn	Professor, Newcastle University, UK.
Alberto Villa	Associate Professor, Institute of Nutrition and Food Technology, University of Chile, Santiago, Chile.
Margaret Woodward	Public Health Specialist, Milk Fluoridation Project Co-ordinator, UK.

Contents

Preface

P.E. Petersen

1. Milk, nutrition and human health	
<i>A. J. Rugg-Gunn and P. E. Petersen</i>	1
1.1 Introduction	1
1.2 Types of milk, their treatment and nutritional value	1
1.3 Milk consumption around the World	5
1.4 The effect of the rise in non-alcoholic beverage consumption on milk consumption	7
1.5 Public health milk programmes and health implications	8
1.6 Milk intolerance	11
1.7 Milk and dental health	12
1.8 Summary	18
2. Clinical studies	
<i>J. Bánóczy and A.J. Rugg-Gunn</i>	19
2.1 Introduction	19
2.2 Early studies	19
2.3 The Borrow Foundation	21
2.4 Scotland	22
2.5 Hungary	26
2.6 Israel	32
2.7 Louisiana, USA	33
2.8 Bulgaria	34
2.9 China	39
2.10 Chile	41
2.11 United Kingdom	45
2.12 Russia	50
2.13 Other studies	54
2.14 Discussion of the clinical studies to evaluate milk fluoridation	55
2.15 Conclusions	65
3. Basic science studies	
<i>W. M. Edgar</i>	67
3.1 Introduction	67
3.2 Chemistry of fluoride in milk	68
3.3 Absorption, metabolism and excretion	71
3.4 Effects of fluoride from milk on intra-oral systems	81
3.5 General summary: the biological plausibility of milk fluoridation	90

4. The addition of fluoride to milk	
<i>A. E. Villa</i>	93
4.1 Introduction	93
4.2 Manufacture of fluoridated milk using sodium fluoride	96
4.3 Manufacture of powdered fluoridated milk using disodium monofluorophosphate	98
4.4 Stability of fluoridated milks	99
4.5 Conclusion	105
5. The implementation of community based programmes	
<i>S. M. Woodward</i>	107
5.1 Introduction	107
5.2 Milk distribution systems	108
5.3 Planning and management of schemes	115
5.4 Lessons learnt	124
5.5 Establishing the feasibility and sustainability of a scheme	125
5.6 Summary	126
6. Evaluating fluoride exposure in milk fluoridation programmes	
<i>A. E. Villa</i>	127
6.1 Introduction	127
6.2 Monitoring the quality of fluoridated milk	128
6.3 Biological monitoring	129
6.4 Determination of fluoride in fluoridated milk and in urine	133
6.5 Conclusions	135
7. Programme evaluation	
<i>P. E. Petersen and A. J. Rugg-Gunn</i>	137
7.1 Why evaluate?	137
7.2 What to evaluate	139
7.3 Clinical effectiveness	140
7.4 Design strategy	143
7.5 Economic evaluation	144
7.6 Evaluation of safety	145
7.7 Process evaluation	146
7.8 Protocol preparation	147
7.9 Summary	155
8. Conclusions	157
References	161

Preface

The burden of non-communicable diseases (NCD) is rapidly increasing; in response to the growing NCD problem, the World Health Organization (WHO) and the Food and Agriculture Organization (FAO) in April 2003 released the report *Diet, Nutrition and the Prevention of Chronic Diseases* (WHO/FAO, 2003). This Report contains the best currently available scientific evidence on the relationship of diet, nutrition and physical activity to chronic diseases, including oral disease. Subsequently, in 2004, WHO initiated a Global Strategy on Diet, Physical Activity and Health with the overall goal of guiding the development of sustainable actions at individual, community, national and global levels, which will lead to reduced disease (WHO, 2005a).

Oral diseases are most prevalent chronic diseases worldwide and are a significant burden to all countries. In reviews of global oral health published by the WHO it is emphasised that despite great improvements in the oral health of populations across the world, problems still persist particularly among the under-privileged groups (WHO, 2003a; Petersen, 2003; Petersen *et al.*, 2005). WHO sees oral health as an integral part of general health, and oral diseases and conditions may have wider impacts on health and wellbeing of people. In addition, oral health and general health share common risk factors, such as poor diet and nutrition, and therefore disease prevention programmes must incorporate oral disease.

预览已结束，完整报告链接和二维码

<https://www.yunbaogao.cn/report/index/report?report>