

REPORT ON THE XXXIIIRD CONFERENCE OF THE INTERNATIONAL SOCIETY FOR FLUORIDE RESEARCH, *DEBILITATING FLUOROSIS: CURRENT STATUS, HEALTH CHALLENGES, AND MITIGATION MEASURES*, HYDERABAD, INDIA, NOVEMBER 9–11, 2016

Fluorosis is endemic in over 25 countries across the globe and millions of people are affected by the consumption of fluoride ion (F⁻)-rich ground water due to the lack of alternative economically viable solutions. About 62 million people, including 6 million children, suffer from fluorosis due to the excess ingestion of F through drinking water. The spectrum of health hazards of fluorosis ranges from the milder form of dental mottling to a severe form of skeletal fluorosis that leads to paralysis of the lower limbs.

There is no medicine available to treat the fluorosis and attempts to mitigate the F problem have been largely concerned with the defluoridation of drinking water. However, these measures have not been fully successful owing to only a limited coverage of at risk areas as well as there being only a low awareness of the problem of F in water, and its associated toxicity, among the populations residing in the endemic areas. Many studies have now been carried out on the molecular mechanisms of F-induced toxicity. Often this research is not well known to academicians, implementing agencies, and NGOs.

In the light of the importance of fluorosis as a public health problem, there is an urgent need to address the various factors influencing the F toxicity and to evolve intervention strategies including education and a wider coverage of at risk areas. Hence, to discuss the various important issues pertaining to the fluorosis problem on one platform, the XXXIIIrd conference of The International Society for Fluoride Research was organized in association with National Institute of Nutrition, Indian Council of Medical Research (ICMR), at Hyderabad from 9–11th November, 2016. The conference theme was *Debilitating fluorosis: current status, health challenges, and mitigation measures* with the following subthemes:

- Epidemiology of fluorosis
- Biological and molecular aspects of fluoride
- Mitigation of fluorosis (nutrition, education, and defluoridation)
- Geology of fluoride
- Fluoride and elemental interaction
- Analytical methods of detection of fluoride in biological tissues, plants, and food.

The conference was focused on subthemes so that the international and national participants would benefit by acquiring the current information/knowledge in order to be of ultimate benefit to the people affected by fluorosis.

A preconference workshop was held on 9th November 2016 to allow hands on experience for the participants in the identification of clinical cases of dental and skeletal fluorosis as well as with the analysis of F in water and urine samples. Approximately 28 national and international delegates participated in the pre-conference workshop which had two sessions.

Session one:

- 1 *The overview and clinical diagnosis of fluorosis* was presented by Dr Arjun L Khandare, Scientist-F, Head Food Toxicology Division, NIN, India, and Organizing Secretary of the conference.
- 2 *The medical aspects of fluorosis* was delivered by Dr Raja Reddy, Neurosurgeon, Apollo Hospital, India.
- 3 *The reconstructive and rehabilitative aspects of confirmed cases of fluorosis* was presented by Dr Kama Raj, Orthopaedician, Kamineni Hospital, India.

Session two:

- 1 The standardization of the fluoride analyzer and the analysis of fluoride in water and urine samples were demonstrated.

The inauguration of the main conference was commenced at 4.00 pm on 9th November 2016. The eminent personalities Shri T Longvah, Director-Incharge, National Institute of Nutrition (NIN); Dr Arjun L Khandare, Scientist-F, HOD Food Toxicology Division, NIN, and Organizing Secretary of the conference; Dr Raja Reddy, Apollo Hospital, Hyderabad; Dr SL Choubisa, Professor (Retd.), Regional Editor of *Fluoride* for India; Dr Varinder Garg, Clinical Radiologist and Officer on Special Duty (OSD), Ministry of Health, Government of India, New Delhi; inaugurated the conference by lighting the lamp. The dignitaries present on the dais also received the official conference souvenir. The welcome address was given by Shri T Longvah, Director-Incharge, NIN. Dr Arjun L Khandare, Organizing Secretary, introduced the theme of the conference to the delegates.

Dr Khandare addressed the invitees by saying that this international conference would serve as a platform for various researchers to come together to discuss the current scenario on fluorosis, its toxicity, and ways to mitigate fluorosis.

The key note address was delivered by Dr SL Choubisa on the conference theme *Debilitating fluorosis: current status, health challenges and mitigation measures*. Later, a lecture was delivered by Dr Varinder Garg about the clinical and radiological aspects of fluorosis.

The main conference was encompassed with five symposia and a Niloufer Chinoy Award oral session:

- 1 Symposium I: Biological aspects of fluorosis
- 2 Symposium II: Molecular aspects of fluorosis
- 3 Symposium III: Global epidemiological perspectives of fluorosis
- 4 Symposium IV: Associated factors and fluorosis
- 5 Symposium V: Fluorosis mitigation
- 6 Niloufer Chinoy award oral session.

A total of 145 participants from India and abroad participated in the conference. The participants gave 37 oral presentations, 5 Niloufer Chinoy Award oral presentations, and 37 poster presentations covering the topics of the biological and molecular aspects of fluorosis, the epidemiology of fluorosis, and the mitigation of fluorosis. The papers presented during the conference were all interesting and included the following:

Dr Kenji Akiniwa, Japan, presented a paper on *Carcinogenicity of fluoride estimated by the prevalence of dental fluorosis*. The observed/expected cancer prevalence rates caused by the

total daily F intake were estimated from the cancer prevalence rates associated with water fluoridation and the increased number of persons with dental fluorosis. The paper was greatly appreciated by the participants.

Dr Masashi Tsunoda, Japan, delivered a lecture on *The effects of fluoride on the gene expressions of cytokines in the thymocytes and splenocytes from the Highiga mice after subacute exposure via drinking water.*

Dr P Mahaboob Basha, India, presented a paper on the *Effect of fluoride on protein oxidation and DNA fragmentation: a multigenerational assessment.* His findings are consistent with the hypothesis that the multi-generational exposure to F during pregnancy is in part due to epigenetic alterations.

Dr Arjun L Khandare, India, delivered a lecture on the *Carbonic anhydrase upregulation plays key role in ameliorating fluoride induced toxicity in experimental rats supplemented with Tamarindus indica fruit extract.*

Dr Andezhath K Susheela, India, presented a paper on *Fluorosis and linked diseases: a new dimension.* Tracing the historical perspectives, it was pointed out that fluorosis appears as three well defined entities: dental, skeletal and non-skeletal fluorosis. Non-skeletal fluorosis afflicts soft-tissues leading to early health complaints and, when the diagnosis is suspected, cases can be confirmed by conducting laboratory tests. The possibility of complete recovery from some forms of fluorosis has emerged in the last two decades. From recent investigations and publications, we now understand that fluoride is a neurotoxin, hormone disrupter, and enzyme inhibitor and can lead to grave problems including a number of linked disorders including (i) extended effects in children with thyroid hormone deficiencies including bone deformities and neurotoxicological effects, (ii) anaemia leading to the non-absorption of nutrients and/or orally administered iron and folic acid tablets given to correct anaemia in pregnancy, adolescent girls, boys, and others, (iii) cardiovascular diseases leading to high blood pressure, raised cholesterol levels, and blood vessel blockage which may result in treatment by angioplasty or bypass surgery, and (iv) renal failure which may result in treatment by kidney dialysis or renal transplantation. In conclusion, knowledge of these linked diseases will enable physicians and surgeons to have a broader view of the dimensions of fluorosis. Creating a greater awareness of the fluorosis-linked diseases is an integral part of fluorosis mitigation and will be beneficial to those afflicted by fluorosis.

Dr Amir Hossein Mahvi, Iran, presented a paper on *Fluoride concentration of drinking water and prevalence of dental fluorosis.* His comprehensive study was carried out using four electronic databases including PubMed, Scopus, SID, and IranMedex.

Dr S Dobaradaran, Iran, presented a paper on *A comparative study of environmental friendly biosorbents for removal of fluoride from aqueous solutions.*

Five young scientists, aged up to 35 yr, participated in the oral section and 10 in the poster section for the last of the Niloufer Chinoy Awards, kindly donated by Professor Jörg Spitz for five ISFR conferences, commencing in Jaipur in 2010, to commemorate the late Professor Chinoy, ISFR President 2005–2006. Six of the participants, three oral and three poster, were selected to receive awards.

A General Business Meeting of the ISFR was held from 1.00–1.45 pm on 10th November 2016.

- Dr Arjun Khandare, Scientist-F, HOD Food Toxicology Division, NIN, Hyderabad, India, was elected President of the ISFR for 2016–2018.

- It was agreed that the next ISFR conference, the XXXIVth, will be held in 2018 in Guiyang, Peoples Republic of China, with the host being Professor Zhi-

Zhong Guan, Department of Pathology and Key Lab of Endemic and Ethnic Diseases (Guizhou Medical University), Ministry of Education, Guiyang Medical University, Guiyan, Peoples Republic of China. Professor Guan was also elected First Vice-President of the ISFR for 2016–2018.

- It was also agreed that the XXXVth conference would be held in 2020 in Tehran, Iran, with the host being Dr Amir Hossein Mahvi, Department of Environmental Health Engineering, School of Public Health and Institute for Environmental Research, Tehran University of Medical Sciences, Tehran, Iran. Dr Mahvi was also elected Second Vice-President of the ISFR for 2016–2018.

- The ISFR financial report for the year ended 31st March 2016 was adopted. (The report can be viewed at www.charities.govt.nz. Enter the charity number CC36709, click on *Search the register*, click on *The International Society for Fluoride Research*, and the Annual Return Summary will be shown including details on the ISFR and the financial report.)

To discuss the current scenario and future aspects of fluoride toxicity and its mitigation a panel discussion on *Intervention strategies for fluorosis mitigation and policies* was conducted at 2.30 pm on 10th November 2016. The issues discussed included educating people on the importance of safe drinking water and the hazards of excessive F in drinking water; health education activities such as health talks and lectures; health screening camps; demonstrations of defluoridation techniques; the establishment of a data base on F levels in drinking water for the entire country; publishing newsletters, books, folders, and pamphlets; and developing a website and mobile apps.

The conference culminated with the valedictory session. The awardees of the Niloufer Chinoy awards were presented with their cash prizes along with certificates. The conference was concluded with the vote of thanks to all of those who helped with and participated in the conference by the conference Organizing Secretary, Dr Arjun L Khandare.

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Attendees at the XXXIIIrd ISFR conference, Hyderabad, India, November 9-11, 2016.