

Global health issues related to cleft lip and palate: Prevention and treatment need to team together



“The doctor of the future will give no medicine, but will instruct his patients in the care of the human frame, in diet, and in the cause and prevention of disease.”

Thomas Edison, 1903

Oral health can be characterized as a functional, structural, esthetic, physiologic, and psychosocial state of well-being that is essential to an individual’s general health and quality of life.

Oral diseases represent the most common diseases with significant socioeconomic impact; however, still frequently neglected in public health policy (see two recent editorials in this journal by SM Balaji, 2016). The major oral diseases that constitute with no doubt a serious global burden are dental caries, periodontal diseases, edentulism, cancer, and cleft lip and/or palate anomaly. It is very important to integrate oral health into a general global health agenda.^[1]

The orofacial region is one of the most sensitive parts of a developing human embryo and early fetus. It is also more than any other area prone to abnormal development. Cleft lip and/or palate anomalies are the most common and most severe congenital anomalies of the face and mouth and the second most common birth defects in general.

Combined birth prevalence of orofacial clefts has been estimated 17/10,000 live births. There are 7.3 million individuals with orofacial clefts in the world today. With a projected population increase, there will be 1.4 times more people in 20 years from now. When looking more in detail at estimated population growth, the countries with largest populations are China, India, and the USA. While population in more developed countries stays practically the same between 2015 and 2050, almost doubled population (1.89 times increase) is expected in the less

developed countries. It is estimated that in less developed countries, the population will increase by 2.9 billion, which translates to additional 2.9 million of individuals with an orofacial cleft. The most efficient way how to deal with such an increase seems to be an investment and support of cleft prevention strategies and programs.

What do we already know about prevention of orofacial clefts?

The majority of orofacial clefts, about 65%–70%, are nonsyndromic. Like most common congenital anomalies, they are caused by interactions between genetic and environmental factors. Genetic factors create susceptibility for a cleft that is heritable. Environmental factors interact with a susceptible genotype and may trigger a development of a cleft during an early stage of embryonal development.^[2] In the present genomic era, numerous genetic polymorphisms and loci have been identified.^[3] However, it has been estimated that genetic mutations can explain only 20% of etiology of nonsyndromic cleft lip and palate (NCLP) patients.

Many other studies were focused on roles of mother’s nutrition, smoking, stressful lifestyle, high-sugar diet, obesity, diabetes, and other environmental factors. It has been discovered that a sufficient intake of folic acid and some other vitamins (Vitamin B6) and minerals (Zn) is pivotal.

In Lancet in 1982, we first published our results suggesting that NCLP can be prevented by periconceptional supplementation with folic acid. Later, we showed that recurrences were decreased by 65%, when mothers were daily supplemented with multivitamins containing 10 mg folic acid^[4] and occurrences were decreased by 27%–50%, when mother’s diet contained 400 mcg of folic acid daily.^[5]

Investment in prevention of birth defects has a very high return. It has been shown clearly in the USA when

folic acid fortification project was evaluated in respect to prevention of neural tube defects. The food fortification of all cereal-grain products (0.14 mg folic acid/100 g) started in the USA in January 1998. The last evaluation estimated the benefit-cost ratio as 40:1. The estimated economic benefit was \$312–425 million annually, and the savings (net reduction in direct costs) were in range of \$145–588 million per year.

Periconceptional supplementation with folic acid was also shown to decrease a rate of congenital heart defects.

In summary, there is already enough scientific evidence suggesting that a significant proportion of NCLP is preventable. However, different genes creating susceptibility for NCLP and different environmental factors triggering them exist in different populations, even in different individuals - we can say “one size does not fit all.” Therefore, a prevention approach has to identify those differences and develop specifically tailored cleft prevention strategies.^[6]

Multidisciplinary, focused meetings helped advance scientific collaborations. In 1996, we organized the symposium “Approach to the Prevention of Orofacial Clefts” in Emeryville, California. Several meetings discussing an optimal design for a NCLP prevention trial followed (WHO meeting on the prevention of orofacial anomalies in 2001, global strategies to reduce the health-care burden of craniofacial anomalies in 2002).

The 10th World Cleft Lip and Palate Congress organized in 2016 in Chennai, India, had a theme “Cleft prevention in limited resources setting” as a basic effort in the direction highlighted in the title of this editorial. Such meetings help renew, reorient our focus on the prevention aspect of orofacial clefts. The new knowledge and skills can be passed without barriers from developed nations to developing world in an effort to lessen the burden of orofacial clefts in a cost-effective way. Such an exchange of skills and knowledge was achieved, and I wish the same for the future meetings.

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REFERENCES

1. Jin LJ, Lamster IB, Greenspan JS, Pitts NB, Scully C, Warnakulasuriya S. Global burden of oral diseases: Emerging concepts, management and interplay with systemic health. *Oral Dis* 2016;22:609-19.
2. Tolarova MM. Pediatric Cleft Lip and Palate. *E Medicine Journal Pediatrics: Surgery – Genetics*. Medscape; November, 2015. aVAILABLE FROM: <http://emedicine.medscape.com/article/995535-overview>. [Last accessed on November 2016].
3. Leslie EJ, Marazita ML. Genetics of cleft lip and cleft palate. *Am J Med Genet C Semin Med Genet* 2013;163C: 246-58.
4. Tolarova M, Harris J. Reduced recurrence of orofacial clefts after periconceptional supplementation with high-dose folic acid and multivitamins. *Teratology* 1995;51:71-8.
5. Shaw GM, Lammer EJ, Wasserman CR, O'Malley CD, Tolarova MM. Risks of orofacial clefts in children born to women using multivitamins containing folic acid periconceptionally. *Lancet* 1995;346:393-6.
6. Tolarova MM, Mosby T, Capozzi A, Tolar M. Thirty Years of Studies, Experience, and Nuts and Bolts on Our Journey toward Primary Prevention of Cleft Lip & Palate. In book: *Management of Cleft & Craniofacial Deformities. Current techniques, Research & Future Directions. Transaction of 7th Biennial World Cleft Lip and Palate Congress of ICPE*; 2012. Chapter: Cleft Prevention in Limited Resources, Editors: S.M.Balaji, p. 30-53. Available from: https://www.researchgate.net/publication/291830718_Thirty_years_of_studies_experience_and_nuts_and_bolds_on_our_journey_toward_primary_prevention_of_cleft_lip_and_palate. [Last accessed on November 2016].

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