

Genomic Studies in the Field of Dentistry – An Indian Scenario

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Dental sciences are an area of specialization which involves not only the oral cavity but the adjoining head and neck region. The different specialties of dentistry range from diagnosis to treatment of dental diseases. In a developing country like India, the total population and number of dental institutes account for the second highest number in the world. The role of research is imperative. The area of research in dentistry can range from epidemiology, material sciences and upto genomic research. The focus of molecular studies in dentistry is primarily oriented towards identifying the etiology, pathogenesis and prognosis of various disease processes. The limitations of doing genomic research in a developing country are paucity of funds or the access to the advanced laboratory infrastructure.

Genetic studies in dentistry include identification of molecular alterations during embryologic development, microflora in infections and habit associated carcinogenesis.

Microbial studies in dentistry are often focused on microflora in dental caries, periapical infection or periodontal pathologies. Recently, studies on the role of Human Papilloma Virus (HPV) in oral squamous cell carcinoma and oral manifestations of HIV viruses have gained more relevance.

Syndromes with craniofacial manifestations are common in dental practice and often studied for the underlying genetic defects. Racial variations and associated gene polymorphisms in prevalence of developmental disorders are also evaluated.

Genomic changes can be associated with development disorders of tooth or jaw, such as tooth agenesis or structural defects of tooth (Amelogenesis imperfecta & Dentinogenesis imperfecta) and cleft palate affecting the jaws. The tooth formation is controlled by a group of homeobox genes. Amelogenesis imperfecta is often associated with tricho-dento-osseous syndrome, where there is a mutation of homeobox gene known as *Dlx* (distal less homeobox gene) is associated with tooth development. Tooth agenesis is a clinical manifestation in Witkop's syndrome which is associated with a nonsense mutation of *MSX-1* (Muscle segment homeobox) gene. *MSX-1* is also found to be altered in patients with cleft lip & cleft palate [1,2,3].

Large part of research in dentistry in India is concentrated around regional specific diseases, like oral submucous fibrosis; leukoplakia and

oral cancer, whose prevalence in this country are very high due to the associated habits [4,5,6].

In India, dental institutes aim mainly at rendering patient care for dental disorders and hence the infra-structural requirements for beginning new dental institutes have no emphasis on the research equipments for genomic and molecular studies. The cost of maintaining a research laboratory is very cumbersome which starts from the procurement of equipments and the regular supply of molecular markers or biotechnology grade chemicals for these studies. A very few institutions with post - graduation in oral pathology program in India have the necessary infrastructure for genomic research. In the absence of facilities, the genomic studies are commonly outsourced to some higher end molecular laboratories.

Conclusion

Though in India, genomic research projects are commonly funded by the grants of government institutes like Indian Council for Medical Research (ICMR). The private companies or non-government organisation should also play an important role to facilitate genomic research in dentistry of the developing countries.

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