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Role of MSX1 Gene in Orofacial Clefting : A Systematic Review

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INTRODUCTION

Orofacial clefting has always been the bane of the human race . It affects the overall wellbeing of the affected individual both phycological as well as physical . The Incidence of orofacial clefts have been around 1:500[4] . Orofacial clefts can occur from an isolated cleft palate to a bilateral cleft lip and palate . Severe facial deformation gives the affected individuals a psychological set back . In developing countries like India where the cleft care does not reach to the rural population , the severity of unoperated clefting becomes more evident .

The search for cause of orofacial clefting has been under research for a while now . While two forms of orofacial clefting , syndromic and non syndromic clefting have been researched extensively . The interest in Non syndromic clefting has grown more as it is a condition where an apparently healthy individual shows orofacial clefting without any other systemic condition .

In 1969 Carter proposed a model (MF/T) multifactorial clefting inheritance ,where he stated that non syndromic clefting was caused by the additive effects of minor abnormal genes and environmental factors .[1]

MSX genes

The MSX group of genes in vertebrates comprise of a small family of chromosomally unlinked homeobox genes related to the Drosophilia muscle segment homeobox (MSH). MSX genes are expressed in vertebrate specific tissues , including sensory placodes , neural crest , bone and teeth . The MSX genes are classified into MSX1 and MSX2 . MSX 3 found in mice is placed as a subclass of MSX1 subclass .

Knockout experiments with mice have shown a link to MSX 1 to failure to form teeth , and craniofacial abnormalities including absence alveolar bone in the jaws and disturbances in the formation of the parietal , nasal , frontal , cleft palate and malleus of middle ear .

Objective

To test the null hypothesis
MSX 1 gene mutation causes orofacial clefting .

Methodology

Three search bases , Pubmed , Science direct and Cochrane were searched using the key words. The Inclusion criteria for the study was Direct association of MSX 1 gene mutation to orofacial clefting Human subjects with Cleft

RESULTS

Pub med showed 5 , Science direct 79 and Cochrane 1 articles .

Further using the inclusion criteria , 5 articles were selected

DISCUSSION

The Role of MSX 1 gene in Human orofacial clefting has always been debated , this systematic review was designed to find if there were any human studies that implicated orofacial clefting to the MSX 1 gene . In all 4 studies have implicated a direct relation to orofacial clefting . These studies have covered most of the populations around the world . AC Lidral and BC Reising[2] found a Met61Lys substitution in two siblings in a big family with autosomal-dominant tooth agenesis. Venkatesh S Prasad and Venkatesh Shivani [3] found a novel mutation (414G to T) in a south Indian population . Seishi Yamaguchi et al [5] found two *MSX1* variants with an amino acid substitution ; Thr174Ile (T174I) of a hypodontia case and Leu205Arg of a familial oligodontia case in a Japanese Population . Derya Ceyhan , Zuhal Kirzioglu and Nilufer Sahin Calapoglu [6] reported mutations in the MSX 1 gene from a predominant Turkish population .

CONCLUSION

MSX1 gene which is a homeobox gene has been implicated in the formation of orofacial clefting . Several human studies have shown mutations in different populations .

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