

Case Report

A Non-Identical Twin from the Village of Twins with Identical Occlusal Characteristics - A Case Report

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Received: 31/08/2016

Revised: 19/09/2016

Accepted: 22/09/2016

ABSTRACT

Epidemiological studies involving twins are unique in nature as it aids the researcher to investigate the effects of genes and environmental influences for a particular trait. Twin researches are valuable tools as it enlightens the knowledge on the various aspects of the human genome through molecular research methods. The combination of environmental factors and genetics for the development of a particular trait or phenotypes in humans are best demonstrated through the studies involving monozygotic (Identical) as well as dizygotic (Non-identical) twins. An investigation with twins enables to elaborate the genetic effects on the traits or conditions that are multifactorial in nature. Dental characteristics or conditions have multi-factorial inheritance and there is significant evidence in the literature of the influence of genes on the expression of dental and occlusal variables or characteristics which are irrefutable. This case report illustrates about 12-year-old non-identical twin sisters from the unique village of twins who exhibits a near identical dentition status and occlusal characteristics.

Keywords: Dental Occlusion, Dizygotic twins, Genetics, Kodinhi, Twin Research.

INTRODUCTION

Traditionally studies involving twins are conducted to find the relative contribution of genes to a particular phenotype by comparing monozygotic (Identical) twins to dizygotic (Non-identical) twins. The twinning process, as well as the comparative evaluation of twins, provides valuable information into the contribution of genes and environmental factors on the expression of a particular trait. [1] Comparison of physical, as well as behavioural features and disorders among monozygotic and dizygotic twin pairs, facilitates the researchers to quantify as interpret the relative contribution of genes and environmental factors. [2,3]

For exploring any risk traits or conditions, twin research provides with the

best option as it enables to control genetic variations. To quantify and estimate the heritability of traits due the effects of the environment (shared as well as unshared) on an individual, twins serve as a valuable tool. [4] Five main types of twin pairs can be used for a study if zygotic nature and sex are taken into account: Monozygotic Male pairs, Monozygotic Female pairs, Dizygotic Male pairs, Dizygotic Female pairs and Dizygotic Male-Female pairs. Genetic linkage analysis and comparative correlative studies between same-sexed and opposite-sexed dizygotic twins are more powerful in nature. [3,5]

Monozygotic twins exhibit more of similar characteristics as they have 100% of their genes in common, whereas dizygotic twins who have only 50% of their genes in

common exhibit less similarity. This report is based on the findings obtained from 12-year-old female non-identical twin sisters who exhibited a near similar occlusal as well as dentition characteristics.

CASE REPORT

With the presence of more than 200 twins, Kodinhi a village situated in Malappuram District, Kerala, India is popularly known as the 'Village of Twins'. The rate of twin birth is several folds higher than the national as well as the global average of twin birth. Women married off from this village as well as ones married to this village too gave birth to twins. [6] The puzzling phenomenon of the high rate of twin birth in this particular village is a subject of research.



Figure 1: Case of Non-identical Twin Sisters

A research on the anthropometric measures (Height and Weight); photographic analysis (Facial Profile and Lateral Profile Form) and occlusal characteristics (Dentition status and Occlusal Characteristics) were carried among the twins of this village, the ethical clearance of which was obtained from the University Ethics Committee. Among the investigated twins, a 12-year-old dizygotic (Non-identical) female twin (Figure 1) presented with near similar dentition status and occlusal characteristics.

Anthropometric measures differed between the two siblings (Height: Twin A= 142 centimetres and Twin B=138 centimetres; Weight: Twin A=31.6 kilogrammes and Twin B=32.9 kilogrammes). The facial form of one was long and thin (Figure 2 A), whereas of the sister was the broad and square type (Figure 2 B). One had a convex lateral facial profile of (Figure 2 C) and the other a straight one (Figure 2 D). Both had Class I canine relation (Molar relation could not be recorded as the mandibular molars were grossly decayed in both). Measurement of dentition using Digital Vernier Callipers from the study models showed that mesio-distal diameters were near same for the entire dentition except for maxillary central and lateral incisors in one the sibling and even the labio-lingual measures differed in relation to only these two teeth (Figure 3 A & B). The arch form in relation to maxillary and mandibular arch (U-Shaped Arch Form) was similar in both the siblings (Figure 4 A-D). Both exhibited no type of malocclusion. Assessment of dentition status showed that all teeth in the maxillary arch were caries-free in both (Figure 4 A & B), whereas mandibular first molars (Right and Left) were grossly decayed and the extension of caries was near similar in both (Figure 4 C & D). Hypoplastic enamel was evident in relation to all maxillary and mandibular first premolar as well as on right mandibular second premolar, but the severity differed among the siblings.



Figure 2(A-D): Facial and Lateral Extra-oral view

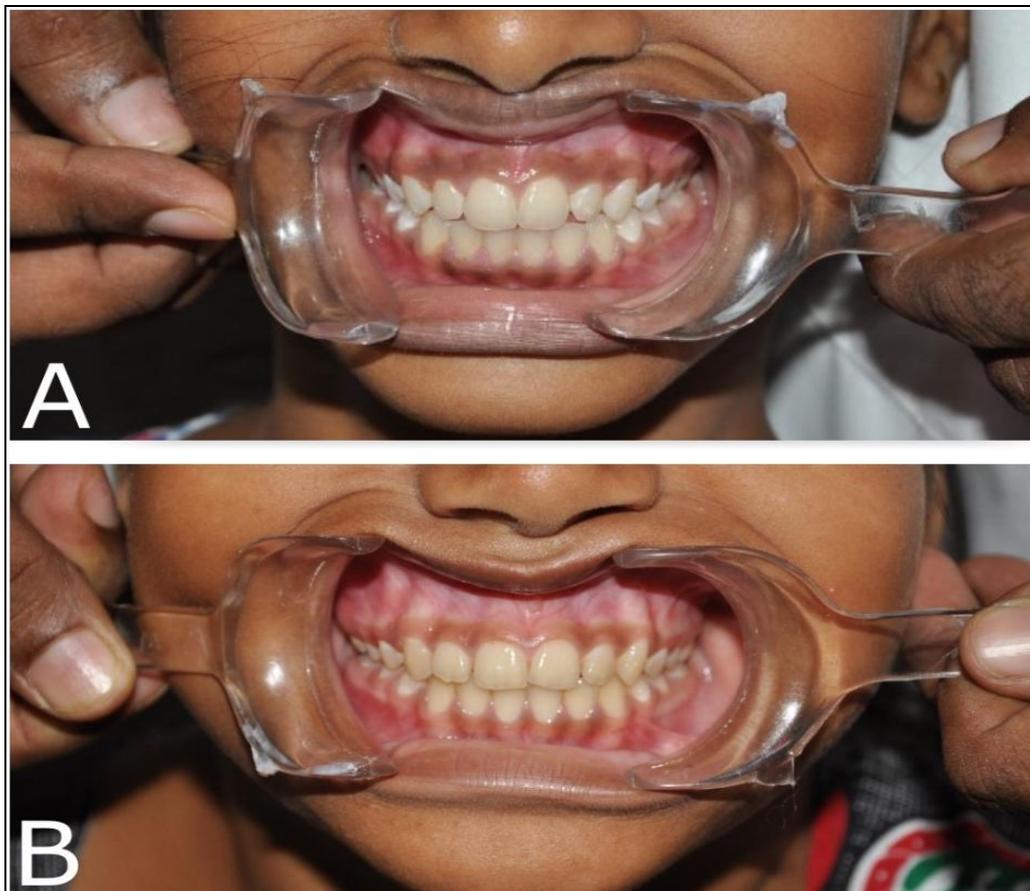


Figure 3(A & B): Intra-oral Facial view

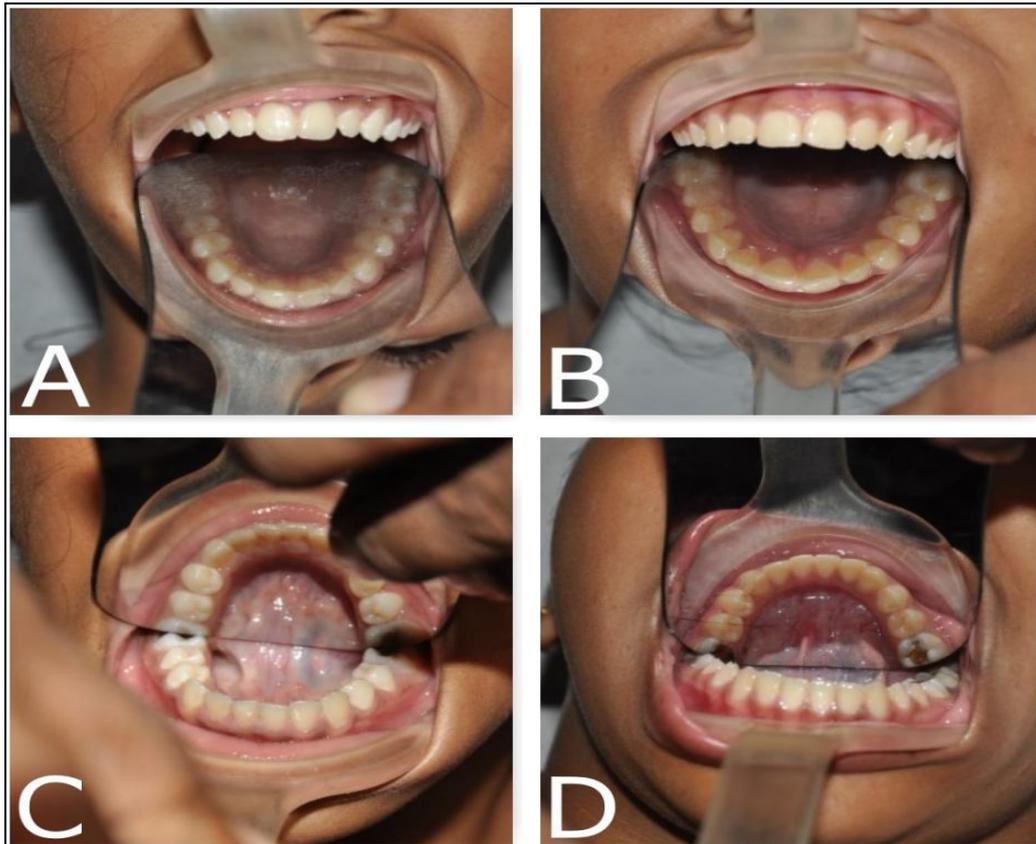


Figure 4(A-D): Intra-oral Occlusal view

DISCUSSION

To understand the normal as well as the abnormal dentofacial development are best explained with the help of twin studies as they illustrate the genetic, epigenetic influences and the environmental factors responsible for it. [7,8] Research with twins is unique in nature as it enables to identify and remove the confounding factors during comparison of twins as they naturally occurring matched pairs. [9]

This case of non-identical twin sisters who exhibited similar dentition status and occlusal characteristics is a unique finding to be reported. Extent of dental caries activity and hypoplastic enamel as recorded in this case exhibited an identical pattern. The two siblings have been sharing the same environment since birth, thus the environmental factors that may have influenced during the growth and development are the same and have affected both in the same manner. Both also share a common social, economic, cultural and ethnic background. A dizygotic twin who

rarely exhibits similarity of any characteristics may display similarity owing to the fact they do share 50% of their genes as well as the similar pre- and the post-zygotic environment. [10]

Genetics, as well as environmental factors, play a crucial role in the manifestation of common dental diseases or disorders like dental caries, periodontal diseases and dental malocclusion. The multifactorial etiology of the three dental diseases or condition is well established, still, there exists a severe lack of evidence of any single gene effect responsible for the same. [11,12] Disease spectrum as seen in relation to oral cavity ranges from developmental disturbances and defects, precancerous and cancerous lesions, syndromic and non-syndromic oro-facial defects which are closely associated with the expression of an array of genes. [13]

To a successful diagnosis and treatment of any oro-facial conditions, solid background knowledge of the disease is essential. This knowledge is limited due to a

multitude of facts such as lack of well-designed research to answer the particular research question and limited knowledge about the genetic mechanism involved. [14] With the emergence of advances in molecular biology, craniofacial biology and quantitative genetics, a better understanding of the genetic and environmental factors that affect the multi-factorial human diseases and disorders can be known. [3,15] Owing to the fact that, the inheritance of dental anomalies are polygenic in nature, further studies are required to determine the specific genes responsible for a particular craniofacial trait.

CONCLUSION

Twins (Monozygotic and Dizygotic) provides a valuable insight into the genetic and environmental factors for the development of a particular disease or disorder. Results from multi-disciplinary studies involving twins will enable to translate the knowledge obtained in providing preventive as well as curative services to the community at large. This case report opens a new chapter of research and as it focuses on a non-identical twin for the village of twins with identical dentition status and occlusal characteristics.

ACKNOWLEDGEMENTS

This study received financial grant from Yenepoya University, Mangalore, and Karnataka, India. The authors acknowledge the support provided by the Twins and Kins Association of Kodinhi, Kerala, India for the conduct of the study and are grateful to the twins and their family members for the participation.

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How to cite this article: Jodalli P, Panchmal GS, Sonde L et al. A non-identical twin from the village of twins with identical occlusal characteristics - a case report. *Int J Health Sci Res.* 2016; 6(10):260-264.
