ORIGINAL RESEARCH

Comparison of Oral Hygiene, Plaque Microbiology, Gingival and Periodontal Status among Identical and Non-identical Twins of Kodinhi Village, Kerala

K Vijaya Kumar[1], Ganesh Shenoy Panchmal[2], Reema Sarvesh Agrawal[3], Shruti Sunil[4], Neevan Dsouza[5]

ABSTRACT

Introduction: Kodinhi, a town in Kerala's Malappuram district, India, has the largest number of twins in the country. According to estimates, there are at least 400 pairs of twins in the village. An estimate suggests that globally, twins comprise just 6 of every 1,000 live births, while in Kodinhi they comprise 42 of 1,000 live births. Hence, a cross-sectional study was designed to study the oral hygiene status, plaque microbiology, gingival, and periodontal status of the Kodinhi dwelling twins.

Methodology: Twins born in Kodinhi Village, Kerala, aged 5–20 years were included in the study. Participants were grouped as identical/non-identical. The oral hygiene was assessed using a simplified oral hygiene index (OHIS). The gingival status was assessed using gingival bleeding index (GBI), while periodontal status was assessed using community periodontal index (CPI). Supragingival plaque samples were obtained and assessed for microbiological investigation.

Results: Study population consisted of 37 pairs of twins, there were 18 pairs of identical twins, and 19 pairs of non-identical twins. OHIS score was higher in identical twins as compared to non-identical twins. There was a statistically significant difference between the OHIS of the two groups. There was no significant difference in CPI scores and GBI between identical and non-identical twins. The microorganisms commonly isolated in the present study population were oral alpha lytic streptococci (23.07%), *Staphylococcus aureus* (15.38%), and *Proteus* SPPS (12.82%).

Conclusion: The study concludes no statistically significant difference in plaque microbiology, gingival, and periodontal status except oral hygiene status among identical and non-identical twins of Kodinhi village, Kerala.

[1]Reader, [2]Ex-Senior Professor and Head, [3-5]Assistant Professor

[1]Department of Periodontology, Yenepoya Dental College, Deralakatte, Mangalore, Karnataka, India

[2]Department of Public Health Dentistry, Yenepoya Dental College, Deralakatte, Mangalore, Karnataka, India

[3]Department Incharge, Manubhai Patel Dental College, Vishwajyoti Ashram, Vadodara, Gujarat, India,

[4]Department of Public Health Dentistry, Sree Anjaneya Institute of Dental Sciences, Kerala, Karnataka, India

[5]Yenepoya Research Centre, Yenepoya University, Mangalore, Karnataka, India

Corresponding Author: Reema Sarvesh Agrawal, A-2 Durganagar, Behind Tube Company, Old Padra Road, Vadodara, Gujarat, India. Phone: +91-7406188017. e-mail: drreemachadha@hotmail.com

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INTRODUCTION

Oral health is essential to general health and well-being at every stage of life. It is vital for a good quality of life. Periodontitis is one of the major reasons for tooth loss in adults.

Worldwide severe periodontal disease is found in 15–20% of middle-aged (35–44 years) adults, also oral disease in children and adults is higher among poor and disadvantaged population groups.[1] Shah in her report for the National Commission on Macroeconomics observed that more advanced periodontal disease with the pocket formation and bone loss, which could ultimately lead to tooth loss if not treated properly, may affect 40–45% of the population of India.[2]

Periodontal disease is characterized by loss of supporting tissues of the teeth. This loss often compromises of function and esthetics and may also be associated with pain and discomfort.[3] Periodontitis is initiated and perpetuated by microbial plaque, which accumulates on dental, gingival soft tissue, and restoration. Although many microbial species are isolated from plaque, *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis,* and *Tannerella forsythus* are recognized as the main periodontal pathogens.

There is now a consensus that genetic factors play a role in the susceptibility and severity to periodontitis.[4] There are a limited number of family studies on periodontitis, but collectively, their results suggest that periodontitis aggregates in families.[5] Although family studies might provide the first impression of familial aggregation, they cannot distinguish between the influence of genetic and shared environmental effects as an explanation for the familial clustering of periodontitis. In this respect, twin studies are especially useful.[6]

One way to determine the respective contribution of genes and environment to a trait is to study twins. A study of healthy twins, if properly conducted, will certainly be able to provide multidimensional evidence to distinguish the relative contribution of genetics and environment to disease variation. The classical twin research design, involving comparisons of similarities in identical and non-identical twin pairs and has enabled researchers to quantify the relative contributions of genetic and environmental factors to variation in many human physical and behavioral features and disorders. Indeed, there have been several recent reviews emphasizing the value of twin studies in clarifying how genetic factors affect common dental problems, such as dental caries, periodontal diseases, and malocclusion.[7,8]

Kodinhi, a town in Kerala's Malappuram district, India, has the largest number of twins in the country. According to estimates, there are at least 400 pairs of twins in the village that has a population of 2000 families.[9] An estimate suggests that globally, twins comprise just 6 of every 1,000 live births, while in Kodinhi they comprise 42 of 1,000 live births. Hence, a cross-sectional study was designed to study the oral hygiene status, plaque microbiology, gingival, and periodontal status of the Kodinhi dwelling twins. The aims of this study were to determine the prevalence of periodontal disease and to evaluate the oral hygiene status in these individual and compare the findings among identical and non-identical twins.

METHODOLOGY

It is a descriptive cross-sectional study to assess and compare the oral hygiene and periodontal status in identical and non-identical twins. The ethical clearance was obtained by Yenepoya University Ethical Committee. Twins born in Kodinhi Village, Kerala; aged 5–20 years were included in the study. Subjects with ongoing orthodontic treatment and those who did not consent to the examination were excluded from the study. A consent/assent form was filled by every participant. 37 pairs of twins aged 5–20 years residing in Kodinhi village formed the study population.

Demographic details such as name, age, and sex of each patient were recorded. Participants were grouped as identical/non-identical. Oral examination was carried out using the dental diagnostic instruments and periodontal probe under natural light. The study was carried out by the single examiner, with the assistance of a recorder. Oral hygiene was assessed using simplified oral hygiene index (OHIS) for age 11–20 years. The oral hygiene was assessed using a OHIS for ages 5–6 years, 7–10 years, and deciduous and mixed dentition.[10] For ages 4–6 years, labial surfaces of the 54, 61, and 82 and the lingual surface of 75 were selected. For the mixed dentition, the labial surfaces of the 54, 61, 82, and 26 and the lingual surface of 75 and 46 were selected. The gingival status was assessed using gingival bleeding index (GBI), in which all teeth were assessed for bleeding status. The periodontal status was assessed using community periodontal index (CPI).

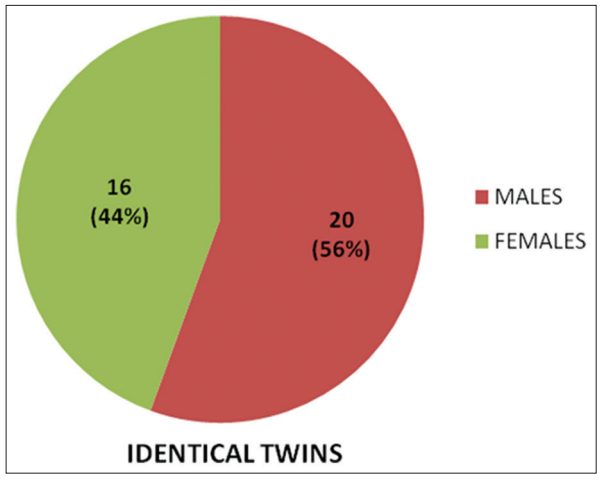
After the clinical examination, four sites (one from each quadrant) were chosen for bacterial sampling. The selected sites were isolated with cotton rolls, and supragingival plaque samples were obtained by inserting one sterile paper point per pocket and suspended in sodium thioglycolate. All microbial samples were transported to the laboratory and processed within 24 h. The samples were inoculated in blood agar medium.

The percentage and mean distribution of the data were obtained and evaluated using descriptive statistics. The comparison between data obtained was done using *t*-test. Statistical tests were done using SPSS 18.0 (Statistical Package for the Social Sciences).

RESULTS

Of the 37 pairs of twins who participated in the study, there were 18 pairs of identical twins and 19 pairs of non-identical twins. The study population was in the age group of 5–20 years. The mean age of the identical and non-identical twins was 11.56 ± 4.19 years and 11.58 ± 3.66 years, respectively. There was no statistically significant difference between the ages of the two groups (P = 0.931). The gender distribution showed that there were 37 males (50%) and 37 females (50%) in the study population [Graphs 1 and 2].

The mean OHIS score in identical twins was 1.15 and in non-identical twins was 0.84. The OHIS score was higher in identical twins as compared to non-identical twins. There was a statistically significant difference between the OHIS of the two groups (P = 0.025). There was no significant difference in CPI scores (P = 0.927)



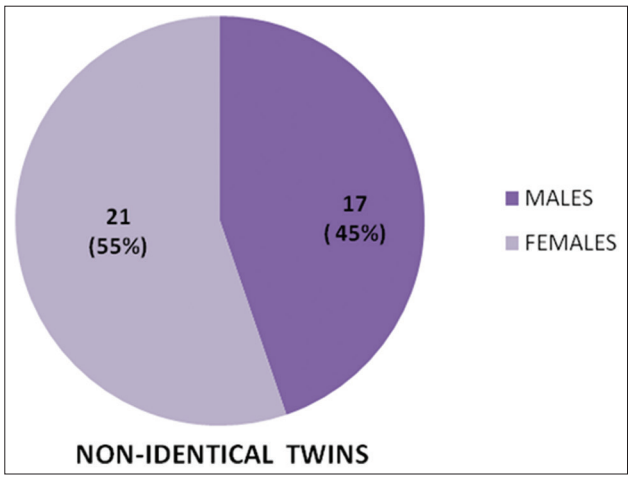
Graph 1: Distribution of identical twins based on gender

and GBI (P = 0.3) between identical and non-identical twins ($P > 0.05$) [Tables 1 and 2].

The microorganisms commonly isolated in the present study population were oral alpha lytic streptococci (23.07%), *Staphylococcus aureus* (15.38%), and *Proteus* SPPS (12.82%) [Table]. There was no significant difference in the microorganisms isolated in the supragingival plaque between the twins and among the identical and non-identical twins ($P > 0.05$) [Table 3].

DISCUSSION

Twin studies play a key role in dental research. It gives the researcher an opportunity to assess the contribution of genetics versus other risk factors in etiology of various dental diseases. The classical twin research design, involving comparisons of similarities in monozygotic (MZ) or identical pairs and dizygotic (DZ) or fraternal pairs, has enabled researchers to quantify the relative contributions of genetic (nature) and environmental (nurture) factors to variation in many human physical and behavioral features and disorders.[11]



Graph 2: Distribution of identical twins based on gender

Table 1: Distributions of study subjects according to age, CPI, GBI and OHIS

Types	Mean	SD	SE mean
Age			
Identical	11.50	4.19	0.70
Non-identical	11.58	3.66	0.59
OHIS			
Identical	1.15	0.66	0.11
Non-identical	0.85	0.46	0.07
CPI			
Identical	1.43	0.57	0.11
Non-identical	1.44	0.50	0.09
GBI			
Identical	89.47	29.93	4.99
Non-identical	82.27	29.34	4.76

Table 2: Comparison between identical and non-identical twins according to age, OHIS, CPI and GBI

Parameters	*t*-test for equality of means				
	95% confidence interval of the difference				
	t	P	Mean difference	Lower	Upper
Age	−0.086	0.931	−0.079	−1.90	1.74
OHIS	2.296	0.025	0.299	0.04	0.56
CPI	−0.092	0.927	−0.013	−0.29	0.26
GBI	1.045	0.300	7.19	−6.54	20.94

The authors of a study undertook a prospective study among 15,273 Swedish twins (1963–2000) to examine whether genetic factors underlying poor oral health and cardiovascular disease could explain previous associations. They concluded that there appears to be a common pathogenetic mechanism between poor oral health and cardiovascular disease.[13] Hence, assessing the role of genetics in oral diseases is of utmost importance.

A study by Michalowicz *et al*. of periodontitis and gingivitis in 64 MZ twin pairs and 53 DZ twin pairs reared together confirmed that approximately 50% of the variance in adult periodontitis could be attributed to genetic factors.[12] The current study reveals the comparison between oral hygiene, plaque microbiology, gingival, and periodontal status among identical and non-identical twins. There was strong evidence of heritability for CPI and GBI between identical and non-identical twins in this study. The OHIS score was higher in identical twins as compared to non-identical twins.

Data from these 110 pairs of adult twins suggest there is a genetic component to levels of supragingival plaque and clinical measures of the periodontium.[14] The results in this study are similar to our study for the groups examined; the concordance rates were not significantly different ($P > 0.05$) between identical and non-identical twins.

Further research in higher age groups is suggested to extrapolate this date to the general population.

Table 3: The subject-based prevalence of the bacteria in the study population

Microorganisms	Percentage
Staphylococcus aureus	15.38
Escherichia coli	8.97
Pseudomonas aeruginosa	7.69
Proteus spp.	12.82
Oral alpha lytic streptococci	23.07
Acinetobacter spp.	6.41
Klebsiella pneumoniae	7.69
B-lytic streptococci	6.41
Coagulase-negative staphylococcus	3.84
Enterobacter spp.	2.56
Citrobacter spp.	1.28
Klebsiella spp.	2.56
Morganella morganii	1.28

CONCLUSION

The study concludes no statistically significant difference in plaque microbiology, gingival, and periodontal status except oral hygiene status among identical and non-identical twins of Kodinhi village, Kerala.

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