Prevalence of cleft lip: A retrospective hospital based study

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ABSTRACT

Amongst the most frequent congenital birth defects are facial malformations, including cleft lips associated with or without cleft palate (CL/P) and cleft palate (CP). Although the incidence of such malformations worldwide is around 1.5 per 1,000 live births, the rate for CL/P ranges six-fold and for CP three-fold. The study aims to determine the prevalence and gender variations of isolated cleft lip among patients who have visited Saveetha Dental College and have undergone primary cleft lip repair procedure. A retrospective study was conducted and data collection was done from dental archives pertaining from June 2019 to April 2020. Data consisted of patients with isolated cleft lip who underwent primary cleft lip repair procedure. Data was imported to IBM SPSS Version 20 for statistical analysis. Results were tabulated. From this study, it has been observed that prevalence of isolated cleft lip is more among males (55.6%) compared to females (44.4%) and belonging to the age group 0 to 6 years. Millard’s technique (rotation advancement technique) is the most commonly employed technique for primary cleft lip repair. Male predilection observed (statistically not significant). This study was conducted in a single centre – Saveetha Dental College. Extensive multi centre study with increased sample size is to be done.

INTRODUCTION

Amongst the most frequent congenital birth defects are facial malformations, including cleft lips associated with or without cleft palate (CL/P) and cleft palate (CP). Although the incidence of such malformations worldwide is around 1.5 per 1,000 live births, the rate for CL/P ranges six-fold and for CP three-fold, the rate for cleft lip/palate ranges six times and for cleft palate three times (Little et al., 2004; Mossey et al., 2011). Asian population reports put overall rates at between 1.76 and 1.81, reflecting the higher prevalence in this area (Kim et al., 2002; Wang et al., 2009). With an estimated population of 1.1 billion in India alone the Indian subcontinent remains one of the world’s most populated regions. India is one of the many areas in the world where population estimates of birth defect prevalence are not obtained regularly (Mossey and Little, 2009). Several studies in India have reported differing findings regarding the prevalence of orofacial clefts. This may be due to geographical variation, the various parameters used in the collection of data, the case description used and other methodological problems, such as changes in the standard of the design of the study (Christianson et al., 2005).
Many etiological factors may cause clefts of the lip and/or palate. Some are induced by single mutant genes, chromosome aberrations, some by particular environmental agents, and mostly by the interaction of multiple genetic and environmental variations, each having a relatively small impact in a large number of cases (Fraser, 1970). You can separate clefts into syndromic and non-syndromic clefts (Murray, 2002). Affected people have no physical or developmental defects in non-syndromic clefts. Most reports show that about 70% of cleft lip/palate cases and only 50% of cleft palate cases are non-syndromic (Jones, 1988). It is possible to identify syndromic clefts into chromosomal syndromes, teratogens and uncategorized syndromes (Murray, 2002).

Patients with orofacial clefts may have difficulties with chewing, impaired facial growth (Ariga et al., 2018), oral health (Selvan and Ganapathy, 2016; Subasree et al., 2016; Jyothi et al., 2017; Basha et al., 2018), dental defects, hearing disorders, dysphonia, slurred speech, language cognitive impairment, learning disability, and behavioural wellbeing concerns (Spriestersbach et al., 1973; Hall and Golding-Kushner, 1989; Skinner et al., 1997; Reid, 2004; Kaufman, 1991).

These patients’ management begins with advanced neonatal nursing and may involve both parents and the patient to undergo psychosocial therapy. Along with odontological diagnosis and treatment of conductive and probable perceptive hearing disorders, complex speech and language rehabilitation, orthodontic services (Ashok et al., 2014), and corrective and restorative dental care (Bernheim et al., 2006; Ashok and Suvitha, 2016; Ganapathy et al., 2016; Ajay et al., 2017), one or more surgical procedures typically follow (Ganapathy et al., 2017; Jain et al., 2017; Duraisamy et al., 2019).

Related syndromes can present more complex clinical image that needs additional clinical and genetic diagnostics, specialized care and recommendations (Shprizten and Bardach, 1995; Bauer, 1997). The primary objective of the management of the cleft lip and or palate is the best cosmetic and functional result, with a minimum of procedures and maximum cost efficiency. The key variables that decide the final results are the restoration of dento-facial appearance (Gupta et al., 2010; Venugopalan et al., 2014), as well as regular swallowing and chewing, hearing and voice. The procedure, mostly from birth to adulthood, lasts for a long time and poses significant problems for healthcare systems.

There is ample evidence that the consistency of the outcomes is connected to unique surgical procedures and the abilities of the team members employed in high-volume multidisciplinary centres (Bearn et al., 2001; Vijayalakshmi and Ganapathy, 2016). Rotation Advancement or Millard’s method, named after the person who designed it is the most widely used technique for primary cleft lip repair (Millard and Millard, 1978). Other interventions include the adapted Millard technique (Fork Flap) procedure (Adeyemo et al., 2013) and other conservative approaches to care.

This study was done for epidemiological significance to check the current trends in prevalence of isolated cleft lip among patients who visited Saveetha Dental College and have undergone primary cleft lip repair procedure for the same. The study aimed to determine the prevalence pattern of isolated cleft lip among different age groups and gender. To find the most commonly employed technique for primary cleft lip repair procedure. To check if gender and age have any statistically significant association with the prevalence of isolated cleft lip.

MATERIALS AND METHODS

Study setting

A retrospective study was conducted in Saveetha Dental College by obtaining data from dental archives (single centre study). Ethical approval was obtained from the institutional ethics committee.

Sampling, data collection and tabulation

Non-probability convenience sampling method was employed. The data included records of patients who presented with isolated cleft lip and underwent primary cleft repair procedure. The technique used for primary cleft lip repair procedure was also obtained. Data entries from June 2019 to April 2020 were obtained for the same and were tabulated. All the available data were included (without any sorting process) to reduce sampling bias. Data was analysed and censored data was excluded. The data was then verified by one external reviewer. A data of 27 patients (males – 55.6%; females – 44.4%) belonging to the age group 0 to 6 years was obtained. The technique used for primary cleft lip closure was also obtained.

Data analysis

The tabulated data were statistically analysed by IBM SPSS Version 20 to check prevalence of isolated cleft lip among different age groups, gender, the technique used for primary cleft lip procedures. Also, this study was done to check for any statistically significant correlation between gender, age and technique used. Data was imported to IBM SPSS.
Version 20 and variables were analysed. Pearson’s Chi-square test was used. Results were tabulated and bar charts were plotted.

**RESULTS**

**Age and gender**

Among the 27 patients, 12 (44.4%) were females and 15 (55.6%) were males (Graph 1). 15 patients (55.6%) were below one year, 9 patients (33.3%) were one year old, three patients (11.1%) each belonging to 2 years, 4 years and 6 years respectively (3.7% in each group) (Graph 2).

**Technique used**

Among 27 patients, the primary cleft repair procedure was done using Millard’s technique (rotation advancement technique) in 25 patients (92.6%) and
other techniques were used in 2 patients (7.4%) (Graph 3).

Correlations

The correlation between gender and age shows increased Male predilection in all age groups (Graph 4). The correlation between age and technique shows that Millard’s technique is the most commonly used technique for primary cleft lip procedure among all age groups (Graph 5). Correlation between gender and technique employed showed Millard’s technique to be more prevalent in both the genders. Other techniques were also equally distributed among males and females (Graph 6).

Cleft lip with or without a cleft palate is a multifactorial malformation in which the likelihood of having the anomaly is determined by both genetic and environmental factors. The absence of fusion between the maxillary and medial nasal processes, probably due to mesenchymal mass deficiency, could result in cleft lip, cleft palate, or both and the odontogenic ability of the lateral incisor is likely to come from both of these regions. Several dental problems can result from the prevalence of clefts. Cleft lip with or without cleft palate results in infant sucking problems, which have a significant effect on growth and development (Masarei et al., 2007).

The prevalence of dental caries was found to be substantially higher in children with cleft lip, alveolus and palate in both primary and permanent dentition, according to numerous studies conducted on dental caries (Bokhout et al., 1996; Besseling and Dubois, 2004; Kirchberg et al., 2004). In a population of unilateral and bilateral cleft lip and palate patients, there are many other dental anomalies in dental structure, location and eruption pattern (Tortora et al., 2008). In addition to dental abnormalities, isolated cleft lip, cleft lip and or palate can lead to several other systemic problems such as congenital heart diseases, mouth breathing (Geis et al., 1981; Hairfield et al., 1988).

In cleft with or without cleft palate patients, the most often associated dental defects are associated with lateral cleft side incisors accompanied by central incisors (Pegelow et al., 2012). From birth until adult life, patients with oro-facial clefts need multidisciplinary treatment and typically have greater morbidity and mortality than normal populations. Although in many places, multidisciplinary care teams may be effective, cleft lip and or cleft palate inevitably pose global health problems around the globe, particularly for low-income populations. Accurate data on the birth prevalence of cleft lip and/or cleft palate is relevant as this can serve as a guide for better understanding of its aetiology and for managing resources and strategies for public health.

The prevalence of isolated cleft lip is more in males (55.6%) compared to females (44.4%) (Graph 1). This is in accordance with the study conducted by Nagappan (2015). This might be due to the same geographical location used in the study – Chennai population. Studies done by Sah and Powar (2014); Amidei et al. (1994) there was an increased prevalence among Males. This shows that irrespective of the geographical location, isolated cleft lip is prevalent more in males compared to females. In a study done by Suleiman et al. (2005), the study population had more females. This explains a genetic predisposition to males for isolated cleft lip which is yet to be discovered. In this study, prevalence of cleft lip was seen in children of age 0 to 6 years with majority patients less than one year (Graph 2). This is not in accordance with the study done by Gregg et al. (1981) where the prevalence of cleft lip and or palate among the study population did not exceed 5 years of age (Graph 3). In this study, it is observed that Millard’s technique is the most commonly employed technique to correct isolated cleft lip procedures (92.6%). The correlation between Gender and age group shows increased Male predilection in all age groups (Graph 4). The correlation between age and technique shows that Millard’s technique is the most commonly used technique for primary cleft lip procedure among all age groups (Graph 5). Correlation between gender and technique employed showed Millard’s technique to be more prevalent than both the genders. Other techniques were also equally distributed among males and females (Graph 6). All these correlations are statistically insignificant (p>0.05).

The study is a single entered study and samples were collected from a fixed time frame. Extensive
research to be conducted – multi centre approach with a larger time frame to improve the scope of research. Also, to evaluate the impact of geographical variations, race and habits in the prevalence, pattern and type of orofacial cleft. The qualitative problems experienced during descriptive orofacial cleft epidemiological studies are: case identification using documentation sources such as birth and foetal death certificates, and medical documents that often produce ascertainment, selection bias, or both, and the issue of multiple comparisons (Sayetta et al., 1989). The resulting occurrence and prevalence rates are minimal and may be confounding in studies with insufficient designs or inadequate data.

In Graph 1, X-axis represents gender and Y-axis represents the number of patients. Prevalence is more in males 15 (55.6%) compared to females 12 (44.4%). In Graph 2, X-axis represents the Age and Y-axis represents the number of patients. Majority of the patients 15 (55.6%) were less than 1 year. In Graph 3, X-axis represents technique and Y-axis represents number of patients. Millard’s technique is the most commonly used procedure for primary cleft repair 25 (92.6%). In Graph 4, X-axis represents age and Y-axis represents number of patients. Blue indicates female and green indicates male. There was Male predilection in all age groups except 2 year olds, but was not statistically significant. Chi-square test: p=0.216 (p>0.05 - statistically insignificant). In Graph 5, X-axis represents age and Y-axis represents number of patients. Blue indicates Millard technique and green indicates other techniques. Millard technique is more frequently used among all the age groups, but was not statistically significant. Chi-square test: p=0.364 (p>0.05 - statistically insignificant). In Graph 6, X-axis represents gender and Y-axis represents number of patients. Blue indicates Millard technique and green indicates other techniques. Millard’s technique was found to be more prevalent in both the genders, but was not statistically significant. Other techniques were also equally distributed among males and females. Chi-square test: p=0.869 (p>0.05 - statistically insignificant).

CONCLUSION

From this study, it has been observed that prevalence of isolated cleft lip is more among males compared to females and among the age group 0 to 6 years. Millard’s technique (rotation advancement technique) is the most commonly employed technique for primary cleft lip repair.

Conflict of Interest

The authors declare that there is no conflict of interest for this study.

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REFERENCES

Adeyemo, W. L., James, O., Adeyemi, M. O., Ogunlewe, M. O., Ladeinde, A. L., Butali, A., Emeka, C. I., Ayodele, A. O. S., Taiwo, O. A., Ugwumba, C. U. 2013. An evaluation of surgical outcome of bilateral cleft lip surgery using a modified Millard’s (Fork Flap) technique. African Journal of Paediatric Surgery, 10(4):307–307.

Ajay, R., Suma, K., Ali, S., Sivakumar, J. K., Rakshagan, V., Devaki, V., Divya, K. 2017. Effect of surface modifications on the retention of cement-retained implant crowns under fatigue loads: An In vitro study. Journal of Pharmacy And Bioallied Sciences, 9(5):154–154.

Amidei, R. L., Hamman, R. F., Kassebaum, D. K., Marshall, J. A. 1994. Birth prevalence of cleft lip and palate in Colorado by sex distribution, seasonality, race/ethnicity, and geographic variation. Special Care in Dentistry, 14(6):233–240.

Ariga, P., Nallaswamy, D., Jain, A. R., Ganapathy, D. M. 2018. Determination of Correlation of Width of Maxillary Anterior Teeth using Extraoral and Intraoral Factors in Indian Population: A Systematic Review. World Journal of Dentistry, 9(1):68–75.

Ashok, V., Suvitha, S. 2016. Awareness of all ceramic restoration in rural population. Research Journal of Pharmacy and Technology, 9(10):1691–1691.

Basha, F. Y. S., Ganapathy, D., Venugopalan, S. 2018. Oral Hygiene Status among Pregnant Women. Research Journal of Pharmacy and Technology, 11(7):3099–3099.

Bauer, B. S. 1997. Cleft Palate Speech Management: A Multidisciplinary Approach. Plastic and Reconstructive Surgery, 99(2).

Bearn, D., Mildinhall, S., Murphy, T., Murray, J. J., Sell, D., Shaw, W. C., Williams, A. C., Sandy, J. R. 2001. Cleft Lip and Palate Care in the United Kingdom: The Clinical Standards Advisory Group (CSAG) Study. Part 4: Outcome Comparisons, Training, and Conclusions. The Cleft Palate-Craniofacial Journal, 38(1):38–43.

Bernheim, N., Georges, M., Malevez, C., Mey, A. D.,
Mansbach, A. 2006. Embryology and epidemiology of cleft lip and palate. B-ENT, 2(4):11–19.

Besseling, S., Dubois, L. 2004. The Prevalence of Caries in Children with a Cleft Lip and/or Palate in Southern Vietnam. The Cleft Palate-Craniofacial Journal, 41(6):629–632.

Bokhout, B., Hofman, F. X. W. M., Limbeek, J., Kramer, G. J. C., Prahl-Andersen, B. 1996. Increased caries prevalence in 2.5-year-old children with cleft lip and/or palate. European Journal of Oral Sciences, 104(5-6):518–522.

Christianson, A., Howson, C. P., Modell, B. 2005. March of Dimes: global report on birth defects, the hidden toll of dying and disabled children. CAB Direct.

Ganapathy, D., Sathyamoorthy, A., Ranganathan, H., Murthykumar, K. 2016. Effect of resin bonded luting agents influencing marginal discrepancy in all ceramic complete veneer crowns. Journal of Clinical and Diagnostic Research, 10(12):67–70.

Ganapathy, D. M., Kannan, A., Venugopalan, S. 2017. Effect of Coated Surfaces influencing Screw Loosening in Implants: A Systematic Review and Meta-analysis. World Journal of Dentistry, 8(6):496–502.

Geis, N., Seto, B., Bartoshesky, L., Lewis, M. B., Pashayan, H. M. 1981. The prevalence of congenital heart disease among the population of a metropolitan cleft lip and palate clinic. The Cleft Palate Journal, 18(1):19–23.

Gregg, T. A., Leonard, A. G., Hayden, C., Howard, K. E., Coyle, C. F. 1981. Birth Prevalence of Cleft Lip and Palate in Northern Ireland. The Cleft Palate-Craniofacial Journal, 45(2):141–147.

Gupta, A., Dhanraj, M., Sivagami, G. 2010. Status of surface treatment in endosseous implant: A literary overview. Indian Journal of Dental Research, 21(3):433–433.

Hairfield, W. M., Warren, D. W., Seaton, D. L. 1988. Prevalence of mouthbreathing in cleft lip and palate. The Cleft Palate Journal, 25(2):135–138.

Hall, C., Golding-Kushner, K. J. 1989. Long-term follow-up of 500 patients after palate repair performed prior to 18 months of age. Sixth International Congress on Cleft Palate and Related Craniofacial Anomalies.

Jain, A. R., Ranganathan, H., Ganapathy, D. M. 2017. Cervical and incisal marginal discrepancy in ceramic laminate veneering materials: A SEM analysis. Contemporary Clinical Dentistry, 8(2):272–272.

Jones, M. C. 1988. Etiology of facial clefts: prospective evaluation of 428 patients. The Cleft Palate Journal, 25(1):16–20.

Jyothi, S., Robin, P. K., Ganapathy, D., Anandiselvaraj 2017. Periodontal Health Status of Three Different Groups Wearing Temporary Partial Denture. Research Journal of Pharmacy and Technology, 10(12):4339–4339.

Kaufman, F. L. 1991. Managing the Cleft Lip and Palate Patient. Pediatric Clinics of North America, 38(5):38191–38194.

Kim, S., Kim, W. J., Oh, C., Kim, J. C. 2002. Cleft lip and Palate Incidence Among the Live Births in the Republic of Korea. Journal of Korean Medical Science, 17(1):49–52.

Kirkberg, A., Treide, A., Hemprich, A. 2004. Investigation of caries prevalence in children with cleft lip, alveolus, and palate. Journal of Cranio-Maxillofacial Surgery, 32(4):216–219.

Little, J., Cardy, A., Munger, R. G. 2004. Tobacco smoking and oral clefts: a meta-analysis. Bulletin of the World Health Organization, 82(3):213–218.

Masarei, A. G., Sell, D., Habel, A., Mars, M., Sommerlad, B. C., Wade, A. 2007. The Nature of Feeding in Infants with Unrepaired Cleft Lip and/or Palate Compared with Healthy Noncleft Infants. The Cleft Palate-Craniofacial Journal, 44(3):321–328.

Millard, D. R., Millard, D. R. 1978. Cleft Craft, The Evolution of its Surgery. Plastic and Reconstructive Surgery, II:886–887.

Mossey, P., Little, J. 2009. Addressing the challenges of cleft lip and palate research in India. Indian Journal of Plastic Surgery, 42(3):9–9.

Mossey, P. A., Shaw, W. C., Munger, R. G., Murray, J. C., Murthy, J., Little, J. 2011. Global oral health inequalities: challenges in the prevention and management of orofacial clefts and potential solutions. Advances in Dental Research, 23(2):247–258.

Murray, J. 2002. Gene/environment causes of cleft lip and/or palate. Clinical Genetics, 61(4):248–256.

Nagappan, N. 2015. Periodontal Status Among Patients With Cleft Lip (CL), Cleft Palate (CP) and
Cleft Lip, Alveolus and Palate (CLAP) In Chennai, India. A Comparative Study. Journal of Clinical and Diagnostic Research, 9(3):53–55.

Pegelow, M., Alqadi, N., Karsten, A. L. A. 2012. The prevalence of various dental characteristics in the primary and mixed dentition in patients born with non-syndromic unilateral cleft lip with or without cleft palate. The European Journal of Orthodontics, 34(5):561–570.

Reid, J. 2004. A Review of Feeding Interventions for Infants With Cleft Palate. The Cleft Palate-Craniofacial Journal, 41(3):268–278.

Sah, R. K., Powar, D. R. 2014. Epidemiological Profile of Cleft Lip and Palate Patients Attending Tertiary Care Hospital and Medical Research Centre, Belgaum, Karnataka-A Hospital Based Study. IOSR Journal of Dental and Medical Sciences, 13(5):78–81.

Sayetta, R. B., Weinrich, M. C., Coston, G. N. 1989. Incidence and prevalence of cleft lip and palate: what we think we know. The Cleft Palate Journal, 26(3):242–247.

Selvan, S. R., Ganapathy, D. 2016. Efficacy of fifth generation cephalosporins against methicillin-resistant Staphylococcus aureus-A review. Research Journal of Pharmacy and Technology, 9(10):1815–1815.

Shprintzen, R. J., Bardach, J. 1995. Cleft palate speech management: a multidisciplinary approach. Mosby Incorporated.

Skinner, J., Arvedson, J. C., Jones, G., Spinner, C., Rockwood, J. 1997. Post-operative feeding strategies for infants with cleft lip. International Journal of Pediatric Otorhinolaryngology, 42(2):169–178.

Spriestersbach, D. C., Dickson, D. R., Fraser, F. C., Horowitz, S. L., Mcwilliams, B. J., Paradise, J. L., Randall, P. 1973. Clinical research in cleft lip and cleft palate: the state of the art. The Cleft Palate Journal, 10:113–165.

Subasree, S., Murthykumar, K., Dhanraj 2016. Effect of Aloe Vera in Oral Health-A Review. Research Journal of Pharmacy and Technology, 9(5):609–609.

Suleiman, A. M., Hamzah, S. T., Abusalab, M. A., Samaan, K. T. 2005. Prevalence of cleft lip and palate in a hospital-based population in the Sudan. International Journal of Paediatric Dentistry, 15(3):185–189.

Tortora, C., Meazzini, M. C., Garattini, G., Brusati, R. 2008. Prevalence of Abnormalities in Dental Structure, Position, and Eruption Pattern in a Population of Unilateral and Bilateral Cleft Lip and Palate Patients. The Cleft Palate-Craniofacial Journal, 45(2):154–162.

Venugopalan, S., Ariga, P., Aggarwal, P., Viswanath, A. 2014. Case Report: Magnetically retained silicone facial prosthesis. Nigerian Journal of Clinical Practice, 17(2):260–264.

Vijayalakshmi, B., Ganapathy, D. 2016. Medical management of cellulitis. Research Journal of Pharmacy and Technology, 9(11):2067–2067.

Wang, W., Guan, P., Xu, W., Zhou, B. 2009. Risk factors for oral clefts: a population-based case-control study in Shenyang, China. Paediatric and Perinatal Epidemiology, 23(4):310–320.