

## Prevalence Of Cleft Lip: A Retrospective Hospital Based Study

Research Article

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### Abstract

Facial cleft deformities, including cleft lip with or without cleft palate (CL/P) and cleft palate (CP), are among the most common congenital birth anomalies. While the worldwide prevalence of such deformities is about 1.5 per 1,000 live births, the rate varies six-fold for CL/P and three-fold for CP. Currently there is no national registry for birth defects. Hospital based surveys or studies are the most common source of information on birth defects like NTDs and OFCs in India. Thus several studies have reported varying results. The aim of the study is 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.

**Keywords:** Cleft Lip; Isolated Cleft Lip; Millard Technique; Primary Cleft Lip Repair; Rotation Advancement Technique.

### Introduction

Facial cleft deformities, including cleft lip with or without cleft palate (CL/P) and cleft palate (CP), are among the most common congenital birth anomalies. While the worldwide prevalence of such deformities is about 1.5 per 1,000 live births, the rate varies six-fold for cleft lip/palate and three-fold for cleft palate [30, 33]. Reports in Asian populations put overall rates around 1.76 to 1.81, reflecting the higher prevalence in this region [28, 51]. The Indian sub-continent remains one of the most populous areas of the world with an estimated population of 1.1 billion in India alone. This yields an estimated 24.5 million births per year and the birth prevalence of clefts is somewhere between 27,000 and 33,000 clefts per year [24]. India is one of the many regions of the world where population estimates of the prevalence of birth defects are not routinely collected [24]. Currently there is no na-

tional registry for birth defects. Hospital based surveys or studies are the most common source of information on birth defects like NTDs and OFCs in India. In India, several studies have reported varying results on the prevalence of orofacial clefts. This may be a result of geographical variation, the different criteria used in data collection, the case definition used and other methodological issues like variation in quality of the study design [13].

Clefts of the lip and/or palate can be caused by many etiological factors. In a large series of cases it will be found that some are caused by single mutant genes, some by chromosomal aberrations, some by specific environmental agents, and some (the great majority) by the interaction of many genetic and environmental differences, each with a relatively small effect (the multifactorial group) [15]. Clefts can be divided into syndromic and nonsyndromic clefts [35]. In non syndromic clefts, affected individuals have

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no physical or developmental anomalies. Most studies suggest that about 70% of cases of cleft lip / palate and 50% of cleft palate only are non syndromic [23]. The syndromic clefts can be classified into chromosomal syndromes, teratogens and uncategorised syndromes [35]. Patients with orofacial clefts may suffer from swallowing problems, impaired facial growth [22], oral health [6, 24, 42, 46], dental anomalies, hearing disorders, dysphonia, speech problems, language retardation, learning disability, and problems with psychosocial well being [21, 27, 39, 44, 45]. The management of these patients starts with specialised neonatal nursing and may require psychosocial counselling for both the parents and the patient. One or usually several surgical procedures follow together with odontological diagnosis and management of conductive and possible perceptive hearing problems, complex speech and language rehabilitation, orthodontic programs [4], and preventive and restorative dental care [2, 5, 10, 14, 16, 26, 38]. Associated syndromes may present an even more complex clinical picture, requiring additional diagnostics by clinical geneticists, specific treatment and recommendations [7, 43]. The primary aim of cleft lip and or palate management is the best aesthetic and functional outcome, with a minimum of procedures and optimal cost effectiveness. The restoration of dentofacial appearance [19, 49], as well as normal swallowing and chewing, hearing and speech are the main factors determining the final outcomes. The treatment lasts for a long time, often from birth to maturity, and presents serious challenges for healthcare systems. There is clear evidence that the quality of the results is related to particular surgical techniques, and to the skills of the individual members of the team working in high - volume multidisciplinary centres [8, 50]. The most commonly used technique for primary cleft lip repair is Rotation Advancement technique or Millard's technique named after the person who devised it [32]. Other techniques involve modified Millard's technique (Fork Flap) technique [1] and other conservative treatment approaches [9, 26].

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 aim of the study was 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 has 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 was 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

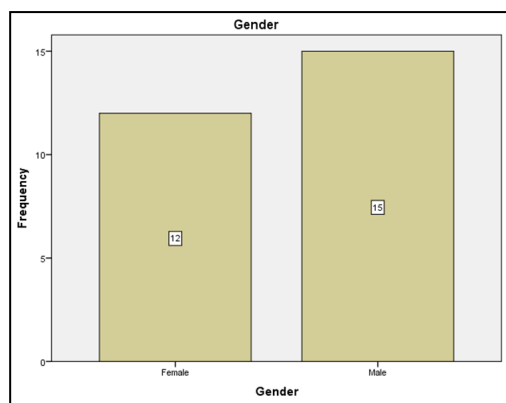
The tabulated data was statistically analysed by IBM SPSS Version 20 to check prevalence of isolated cleft lip among different age groups, gender, the technique used for primary cleft lip procedures. Also, this study was done to check for any statistically significant correlation between gender, age 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)

**Graph 1. Bar graph depicting the gender variations in the prevalence of cleft lip. 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%).**



**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)

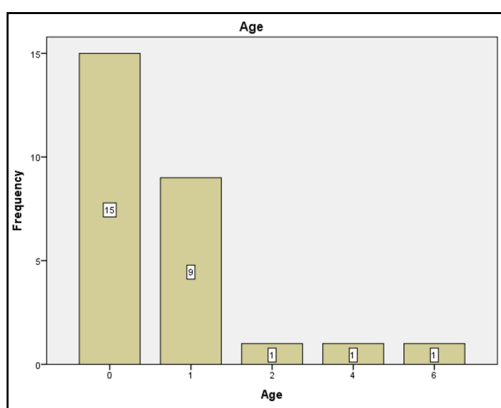
**Correlations**

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

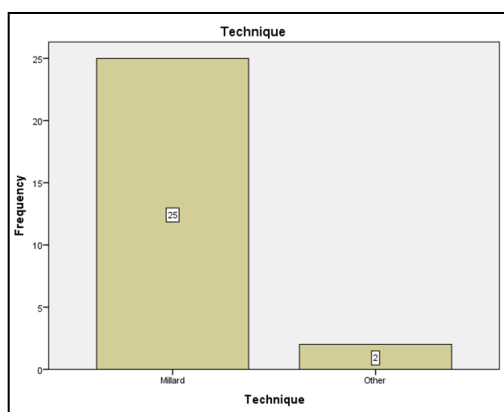
age groups (Graph 5). Correlation between gender and technique employed showed a Millard's technique to be more prevalent in both the genders. Other techniques were also equally distributed among males and females.(Graph 6)

Cleft lip with or without cleft palate is a malformation with a multifactorial cause in which both genetic and environmental factors determine the probability to develop the anomaly. The absence of fusion between the maxillary and medial nasal processes, possibly because of a deficiency of mesenchymal mass, could result in the cleft lip, cleft palate, or both, and it is probable that the lateral incisor odontogenic potential comes from both these regions. Prevalence of clefts may lead to several dental problems. Cleft lip with or without cleft palate leads to sucking difficulties

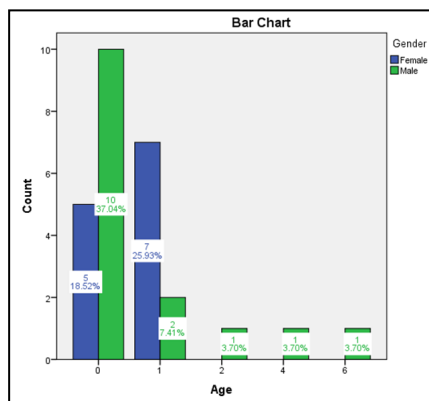
**Graph 2. Bar graph depicting prevalence of cleft lip among different age groups. X axis represents the Age and Y axis represents the number of patients. Majority of the patients 15 (55.6%) were less than 1 year.**



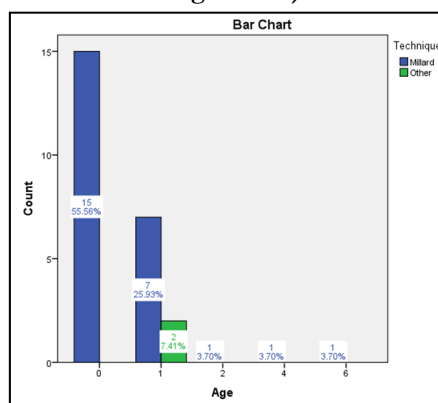
**Graph 3. Bar graph depicting the techniques used for primary cleft lip repair. X axis represents technique and Y axis represents number of patients. Millard's technique is the most commonly used procedure for primary cleft repair 25 (92.6%).**



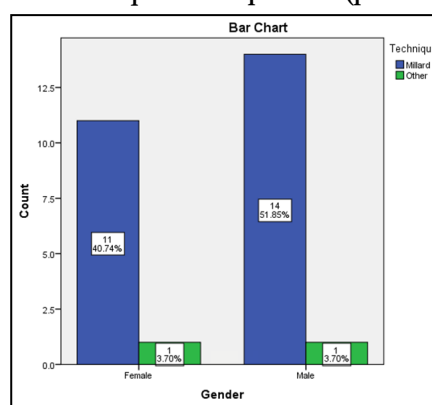
**Graph 4. Bar graph depicting the association between age and gender. X axis represents age and Y axis represents number of patients. Blue indicates female and green indicates male. There was Male predilection in all age groups except 2 year olds, but was not statistically significant.. Chi square test: p=0.216 (p>0.05 - statistically insignificant).**



**Graph 5. Bar graph depicting the association between age and technique used. 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).**



**Graph 6. Bar graph depicting association between gender and technique. 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).**



in infants which greatly affects with the growth and development [31]. According to various studies done on the prevalence of dental caries was found to be significantly higher in children with cleft lip, alveolus and palate in both primary and permanent dentition [11, 12, 29]. There are several other dental abnormalities in dental structure, position and eruption pattern in a population of unilateral and bilateral cleft lip and palate patients [48]. Apart from dental anomalies, isolated cleft lip, cleft lip and or palate can lead to several other systemic problems like congenital heart diseases, mouth breathing [17, 20]. The most commonly associated dental anomalies in cleft with or without cleft palate patients is associated with lateral incisors on the side of cleft followed by central incisors [37]. Patients with oro-facial clefts need multidisciplinary care from birth until adult lives and generally have higher morbidity and mortality than normal populations. Although multidisciplinary care teams can be effective in many places, cleft lip and or cleft palate inevitably pose global health problems around the world, particularly to the low income populations. It is important to have precise data about the birth prevalence of cleft lip and / or cleft palate as this may serve as a guide to better understanding of its etiology and to manage public health resources and strategies.

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 N et al., [36]. This might be due to the same geographical location used in the study – Chen-

nai population. Studies done by Sah RK et al., [40] Amidei et al., [3] 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 Sulaiman A M et al., [47] 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 TA et al., [18] 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 a Millard's technique to be more prevalent in both the genders. Other techniques were also equally distributed among males and females. (Table 6; 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 methodological problems faced during descriptive epidemiological studies of orofacial cleft are : casefinding using data sources such as birth certificates, fetal death certificates, and hospital records that often produce ascertainment bias, selection bias, or both and the multiple comparisons problem (i.e., the chance occurrence of statistically significant findings) [41]. The resultant incidence and prevalence rates from studies with inadequate designs or inadequate data are limited and may be misleading.

## 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.

## References

- Adeyemo WL, James O, Adeyemi MO, Ogunlewe MO, Ladeinde AL, Butali A, et al. An evaluation of surgical outcome of bilateral cleft lip surgery using a modified Millard's (Fork Flap) technique. *Afr J Paediatr Surg.* 2013 Oct-Dec;10(4):307-10. PubmedPMID: 24469478.
- Ajay R, Suma K, Ali SA, Kumar Sivakumar JS, Rakshagan V, Devaki V, et al. Effect of Surface Modifications on the Retention of Cement-retained Implant Crowns under Fatigue Loads: An In vitro Study. *J Pharm Bioallied Sci.* 2017 Nov;9(Suppl 1):S154-S160. PubmedPMID: 29284956.
- Amidei RL, Hamman RF, Kassebaum DK, Marshall JA. Birth prevalence of cleft lip and palate in Colorado by sex distribution, seasonality, race/ethnicity, and geographic variation. *Spec Care Dentist.* 1994 Nov-Dec;14(6):233-40. PubmedPMID: 7754460.
- Ashok V, Nallaswamy D, Benazir Begum S, Nesappan T. Lip Bumper Prosthesis for an Acromegaly Patient: A Clinical Report. *J Indian Prosthodont Soc.* 2014 Dec;14(Suppl 1):279-82. PubmedPMID: 26199531.
- Ashok V, Suvitha S. Awareness of all ceramic restoration in rural population. *Research Journal of Pharmacy and Technology.* 2016 Oct 28;9(10):1691-3.
- Basha FY, Ganapathy D, Venugopalan S. Oral hygiene status among pregnant women. *Research Journal of Pharmacy and Technology.* 2018 Jul 31;11(7):3099-102.
- Bauer BS. Cleft Palate Speech Management: A Multidisciplinary Approach. *Plastic and Reconstructive Surgery.* 1997 Feb 1;99(2):584.
- Bearn D, Mildinhal S, Murphy T, Murray JJ, Sell D, Shaw WC, et al. Cleft lip and palate care in the United Kingdom--the Clinical Standards Advisory Group (CSAG) Study. Part 4: outcome comparisons, training, and conclusions. *Cleft Palate Craniofac J.* 2001 Jan;38(1):38-43. PubmedPMID: 11204680.
- Berkowitz S, Mejia M, Bystrick A. A comparison of the effects of the Latham-Millard procedure with those of a conservative treatment approach for dental occlusion and facial aesthetics in unilateral and bilateral complete cleft lip and palate: part I. Dental occlusion. *Plast Reconstr Surg.* 2004 Jan;113(1):1-18. PubmedPMID: 14707617.
- Bernheim N, Georges M, Malevez C, De Mey A, Mansbach A. Embryology and epidemiology of cleft lip and palate. *B-ENT.* 2006;2Suppl 4:11-9. PubmedPMID: 17366840.
- Besseling S, Dubois L. The prevalence of caries in children with a cleft lip and/or palate in Southern Vietnam. *Cleft Palate Craniofac J.* 2004 Nov;41(6):629-32. PubmedPMID: 15516166.
- Bokhout B, Hofman FX, Van Limbeek J, Kramer GJ, Prah-Andersen B. Increased caries prevalence in 2.5-year-old children with cleft lip and/or palate. *European Journal of Oral Sciences.* 1996 Oct;104(5-6):518-22.
- Christianson A, Howson CP, Modell B. March of Dimes: global report on birth defects, the hidden toll of dying and disabled children. *March of Dimes: global report on birth defects, the hidden toll of dying and disabled children.* 2005.
- Duraisamy R, Krishnan CS, Ramasubramanian H, Sampathkumar J, Mariappan S, Navarasampatti Sivaprakasam A. Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments. *Implant Dent.* 2019 Jun;28(3):289-295. PubmedPMID: 31124826.
- Fraser FC. The genetics of cleft lip and cleft palate. *Am J Hum Genet.* 1970 May;22(3):336-52. PubmedPMID: 4910698.
- Ganapathy D, Sathyamoorthy A, Ranganathan H, Murthykumar K. Effect of Resin Bonded Luting Agents Influencing Marginal Discrepancy in All Ceramic Complete Veneer Crowns. *J Clin Diagn Res.* 2016 Dec;10(12):ZC67-ZC70. PubmedPMID: 28209008.
- Geis N, Seto B, Bartoszesky L, Lewis MB, Pashayan HM. The prevalence of congenital heart disease among the population of a metropolitan cleft lip and palate clinic. *Cleft Palate J.* 1981 Jan;18(1):19-23. PubmedPMID: 6936098.
- Gregg TA, Leonard AG, Hayden C, Howard KE, Coyle CF. Birth prevalence of cleft lip and palate in Northern Ireland (1981 to 2000). *Cleft Palate Craniofac J.* 2008 Mar;45(2):141-7. PubmedPMID: 18333643.
- Gupta A, Dhanraj M, Sivagami G. Status of surface treatment in endosseous implant: a literary overview. *Indian J Dent Res.* 2010 Jul-Sep;21(3):433-8. PubmedPMID: 20930358.
- Hairfield WM, Warren DW, Seaton DL. Prevalence of mouthbreathing in cleft lip and palate. *Cleft Palate J.* 1988 Apr;25(2):135-8. PubmedPMID: 3163288.
- Hall C, Golding-Kushner KJ. Long-term follow-up of 500 patients after palate repair performed prior to 18 months of age. In *Sixth International Congress on Cleft Palate and Related Craniofacial Anomalies 1989 Jun.*
- Jain AR, Nallaswamy D, Ariga P, Ganapathy DM. Determination of correlation of width of maxillary anterior teeth using extraoral and intraoral factors in Indian population: A systematic review. *World J Dent.* 2018 Jan;9:68-75.
- Jones MC. Etiology of facial clefts: prospective evaluation of 428 patients. *Cleft Palate J.* 1988 Jan;25(1):16-20. PubmedPMID: 3422594.
- Jyothi S, Robin PK, Ganapathy D. Periodontal health status of three different groups wearing temporary partial denture. *Research Journal of Pharmacy and Technology.* 2017 Dec 1;10(12):4339-42.
- Ganapathy DM, Kannan A, Venugopalan S. Effect of coated surfaces influencing screw loosening in implants: A systematic review and meta-analysis. *World Journal of Dentistry.* 2017 Nov;8(6):496-502.
- Kannan A, Venugopalan S. A systematic review on the effect of use of impregnated retraction cords on gingiva. *Research Journal of Pharmacy and Technology.* 2018 May 30;11(5):2121-6.
- Kaufman FL. Managing the cleft lip and palate patient. *Pediatr Clin North Am.* 1991 Oct;38(5):1127-47. PubmedPMID: 1886739.
- Kim S, Kim WJ, Oh C, Kim JC. Cleft lip and palate incidence among the live births in the Republic of Korea. *J Korean Med Sci.* 2002 Feb;17(1):49-52. PubmedPMID: 11850588.
- Kirchberg A, Treide A, Hemprich A. Investigation of caries prevalence in children with cleft lip, alveolus, and palate. *J Craniomaxillofac Surg.* 2004 Aug;32(4):216-9. PubmedPMID: 15262251.
- Little J, Cardy A, Munger RG. Tobacco smoking and oral clefts: a meta-analysis. *Bull World Health Organ.* 2004 Mar;82(3):213-8. Epub 2004 Apr 16. PubmedPMID: 15112010.
- Masarei AG, Sell D, Habel A, Mars M, Sommerlad BC, Wade A. The nature of feeding in infants with unrepaired cleft lip and/or palate compared with healthy noncleft infants. *Cleft Palate Craniofac J.* 2007 May;44(3):321-8. PubmedPMID: 17477749.
- Millard Jr DR. CLEFT CRAFT, THE EVOLUTION OF ITS SURGERY. Volume II: BILATERAL AND RARE DEFORMITIES.
- Mossey PA, Shaw WC, Munger RG, Murray JC, Murthy J, Little J. Global oral health inequalities: challenges in the prevention and management of orofacial clefts and potential solutions. *Adv Dent Res.* 2011 May;23(2):247-58. PubmedPMID: 21490237.
- Mossey P, Little J. Addressing the challenges of cleft lip and palate research in India. *Indian J Plast Surg.* 2009 Oct;42Suppl(Suppl):S9-S18. PubmedPMID: 19884687.
- Murray JC. Gene/environment causes of cleft lip and/or palate. *Clin Genet.* 2002 Apr;61(4):248-56. PubmedPMID: 12030886.
- Nagappan N, John J. Periodontal Status Among Patients With Cleft Lip (CL), Cleft Palate (CP) and Cleft Lip, Alveolus and Palate (CLAP) In Chennai, India. A Comparative Study. *J Clin Diagn Res.* 2015 Mar;9(3):ZC53-5. PubmedPMID: 25954706.
- Pegelow M, Alqadi N, Karsten AL. 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.* 2012 Oct 1;34(5):561-70.
- Ranganathan H, Ganapathy DM, Jain AR. Cervical and Incisal Marginal Discrepancy in Ceramic Laminate Veneering Materials: A SEM Analysis. *Contemp Clin Dent.* 2017 Apr-Jun;8(2):272-278. PubmedPMID: 28839415.
- Reid J. A review of feeding interventions for infants with cleft palate. *Cleft Palate Craniofac J.* 2004 May;41(3):268-78. PubmedPMID: 15151444.

- [40]. Sah RK, Powar R. Epidemiological profile of cleft lip and palate patients attending tertiary care hospital and medical research centre, Belgaum, Karnataka-A hospital based study. *IOSR J Dent Med Sci.* 2014;13(5):78-81.
- [41]. Sayetta RB, Weinrich MC, Coston GN. Incidence and prevalence of cleft lip and palate: what we think we know. *Cleft Palate J.* 1989 Jul;26(3):242-7; discussion 247-8. PubmedPMID: 2667813.
- [42]. Selvan SR, Ganapathy D. Efficacy of fifth generation cephalosporins against methicillin-resistant *Staphylococcus aureus*-A review. *Research Journal of Pharmacy and Technology.* 2016 Oct 28;9(10):1815-8.
- [43]. Shprintzen RJ, Bardach J. Cleft palate speech management: a multidisciplinary approach. Mosby Incorporated; 1995.
- [44]. Skinner J, Arvedson JC, Jones G, Spinner C, Rockwood J. Post-operative feeding strategies for infants with cleft lip. *Int J PediatrOtorhinolaryngol.* 1997 Dec 10;42(2):169-78. PubmedPMID: 9692626.
- [45]. Spriestersbach DC, Dickson DR, Fraser FC, Horowitz SL, McWilliams BJ, Paradise JL, et al. Clinical research in cleft lip and cleft palate: the state of the art. *Cleft Palate J.* 1973 Apr;10:113-65. PubmedPMID: 4220387.
- [46]. Subasree S, Murthykumar K. Effect of aloe vera in oral health-A review. *Research Journal of Pharmacy and Technology.* 2016 May 1;9(5):609.
- [47]. Suleiman AM, Hamzah ST, Abusalab MA, Samaan KT. Prevalence of cleft lip and palate in a hospital-based population in the Sudan. *Int J Paediatr Dent.* 2005 May;15(3):185-9. PubmedPMID: 15854114.
- [48]. Tortora C, Meazzini MC, Garattini G, Brusati R. Prevalence of abnormalities in dental structure, position, and eruption pattern in a population of unilateral and bilateral cleft lip and palate patients. *Cleft Palate Craniofac J.* 2008 Mar;45(2):154-62. PubmedPMID: 18333651.
- [49]. Venugopalan S, Ariga P, Aggarwal P, Viswanath A. Magnetically retained silicone facial prosthesis. *Niger J ClinPract.* 2014 Mar-Apr;17(2):260-4. PubmedPMID: 24553044.
- [50]. Vijayalakshmi B, Ganapathy D. Medical management of cellulitis. *Research Journal of Pharmacy and Technology.* 2016 Nov 28;9(11):2067-70.
- [51]. Wang W, Guan P, Xu W, Zhou B. Risk factors for oral clefts: a population-based case-control study in Shenyang, China. *PaediatrPerinatEpidemiol.* 2009 Jul;23(4):310-20. PubmedPMID: 19523078.