Original Research

Variation of Non-syndromic Cleft Lip/Palate in Yayasan Surabaya Cleft Lip/Palate Center Surabaya, Indonesia

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Abstract

Objectives: Congenital anomalies are the biggest cause of prenatal, perinatal, or infant mortality and morbidity. A total of 15% of congenital abnormalities involve the craniofacial and oral segment. Orofacial cleft (OC) is one of the most common examples of congenital abnormalities. One example of OC is cleft lip and/or palate (CL/P). The occurrence of the incident varies depending on geographical location, ethnicity, race, environmental exposure, and socioeconomic status of the patients. The aim of the study was to investigate the variation of non-syndromic CL/P (nsCL/P) in Yayasan Surabaya CLP Center, East Java, Indonesia, as well as the number of occurrences of clefts in each gender. **Materials and Methods:** An analytical observational study with cross-sectional and blind total sampling method was presented. Data obtained from Yayasan Surabaya CLP Center were grouped by type and classified by the LAHSHAL classification system. The numbers were calculated and then divided into occurrence per gender and per family history. A descriptive analysis was applied and then presented in table form. **Results:** The number of patients with cleft lip and palate (CLP), cleft lip (CL), and cleft palate (CP) were 163, 57, and 16, respectively. The more detailed type: ...SHAL, ...AL, and ..HSH.., had the highest number of cases, which were 79, 28, and 10, respectively. **Conclusion:** Most types of CL/P at Yayasan Surabaya CLP Center were CLP, followed by CL and finally CP. The incidence of CLP and CL was more common in men, whereas CP was more common in women.

Keywords: Cleft Lip, Cleft Lip and Palate, Cleft Palate, Orofacial Cleft, Orthodontic

Introduction

Congenital anomalies are structural abnormalities that happen because of faulty development present at birth; they are considered to be the major cause of prenatal, perinatal, and infant mortality and morbidity.[1] Congenital anomalies, also commonly referred to as birth defects, congenital disorders, congenital malformations, or congenital abnormalities,[2] include gross and microscopic malformations, inborn errors of metabolism, intellectual disability, and cellular and molecular abnormalities.[1] Both genetic and environmental factors and their combination in a multifactorial contest may induce congenital defects.[3]

Congenital anomalies involving the craniofacial and oral regions occur in approximately 15% of newborns, with orofacial cleft (OC) being the most common anomaly.[4] OC may involve the lip, the roof of the mouth (hard palate), or the soft tissue in the back of the mouth (soft palate). It also involves structures around the oral cavity.[5]

OC includes all variations of cleft lip and/or palate (CL/P).[6] The incidence varies widely depending on geographic origin, racial and ethnic group, environmental exposures, and socioeconomic status.[7] A CL/P may impact negatively on an individual's self-esteem, social skills, and behavior, especially among girls. Generally, boys are affected more than girls with a ratio of approximately 3:2. Males are more likely than females to have a cleft lip

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Access this article online

Quick Response Code:

Website: www.jioh.org

DOI: 10.4103/jioh.jioh_6_19

How to cite this article: Triwardhani A, Permatasari GW, Sjamsudin J. Variation of non-syndromic Cleft Lip/Palate in Yayasan Surabaya cleft Lip/Palate Center Surabaya, Indonesia. J Int Oral Health 2019;11:187-90.

(CL) or cleft lip and palate (CLP), whereas females are at a slightly greater risk for cleft palate (CP).[5]

On the basis of the problems described, this study will focus to investigate the variation of non-syndromic CL/P (nsCL/P) in Yayasan Surabaya CLP Center, Surabaya, Indonesia.

Materials and Methods

This study was first sent to the Research Ethics Committee of Dental Medicine of Airlangga University for approval (311/HRECC.FODM/XI/2018) and was carried out in Yayasan Surabaya CLP Center.

Yayasan Surabaya CLP Center is one of the charity institutes in Surabaya, Indonesia, that provides free cleft repair and maintenance. Many of the patients with cleft treated by this foundation belonged to the East Java Region. The study was conducted from October 2018, to November 2018, by looking at the patient registration data recorded from January 1, 2017 to December 31, 2017. The registration data contain information (secondary data) on general information of patients, such as name, place where he/she is living, and gender. Besides the registration, data also contain a diagnosis of clefts as well as family history information if a similar disorder occurs in family members. The inclusion criteria of this study were patients with CL, CP, or CLP abnormalities, these patients were recorded in the registration data for Yayasan Surabaya CLP Center in 2017, and these patients only experienced nsCL/P. nsCL/P is known through registration data because if there are other abnormalities, the abnormality will be noted. To find out the existence of a family history in these patients, only information in the form of "Yes" or "No" was available. So the instruments used in this study were the researchers themselves and the secondary data.

The data obtained from Yayasan Surabaya CLP Center were then copied and grouped according to the type of the CL/P. Classification used in Yayasan Surabaya CLP Center was the LAHSHAL classification system, where the "L" stands for lip, "A" for alveolus, "H" for hard palate, and "S" for soft palate. The first letter was used to code the right side and the last letter was used to code the left side and the dot was used to code for no cleft. Data were expressed as frequency. To determine the occurrence of the classified type of CL/P relative to gender and family history, further analysis using Fisher's exact test was used. $P < 0.05$ was considered to have a strong association between the variables.

Results

The total patients who were operated on at Yayasan Surabaya CLP Center in 2017 were 236. Patients with CLP (69%) were the most common CL/P type of patients found at Yayasan Surabaya CLP Center [Table 1]. Variation of CLP [Table 2] shows that cleft on the left side (...SH.L and ...SHAL) had the most cases, that is, 80, followed by bilateral cleft (..HSHAL, LAHSH.., LAHSH.L, and LAHSHAL), with 58 cases, and last, cleft on the right side (LA.S... and LAHS...), with 25 cases. Next, for CL, most cases happened in the left side (.....L and .....AL), with a total of 42 patients, followed with cleft on the right side (L..... and LA.....), with 12 cases, and last, bilateral cleft of CL (L.....L and LA...AL), with the least cases, that is, 3 patients [Table 3]. For CP, cleft on the hard palate (..HSH..) had more patients, with 10 cases, whereas the soft palate cleft (...S...) had 6 cases [Table 4]. Of all the patients undergoing CL/P correction surgery at Yayasan Surabaya CLP Center, male patients were higher in number, with a total of 130 cases, compared to female patients, with just 106 cases [Table 5]. In the case of CLP and CL, the frequencies of patients were higher for males although not significant, whereas for CP, the frequency of patients was strongly associated with females ($P = 0.03$; $P < 0.05$). Of all the patients undergoing CL/P correction surgery at Yayasan Surabaya CLP Center, those who did not have a family history were higher, with 183 patients, whereas those who had a family history of CL/P were just 53 [Table 6]. In the case of CLP and CL, the frequencies of patients with no family history were significantly higher

Table 1: Variation and percentage of patients with cleft lip and/or palate at Yayasan Surabaya CLP Center

Variation of cleft lip and/or palate	Frequency of patient
Cleft lip and palate	163
Cleft lip	57
Cleft palate	16

Table 2: Frequency of patients in each variation of cleft lip and palate

Variation of cleft lip and palate	Frequency of patient
...SH.L	1
...SHAL	79
..HSHAL	11
LA.S...	1
LAHS...	24
LAHSH..	2
LAHSH.L	1
LAHSHAL	44

Table 3: Frequency of patients in each variation of cleft lip

Variation of cleft lip	Frequency of patient
.....L	14
.....AL	28
L.....	1
L.....L	1
LA.....	11
LA...AL	2

Table 4: Frequency of patients in each variation of cleft palate

Variation of cleft palate	Frequency of patient
...S...	6
..HSH..	10

Table 5: Distribution of sample according to gender

Type of cleft lip and/or palate	Frequency of patient		Fisher's exact test
	Male	Female	
Cleft lip and palate	91	72	0.778
Cleft lip	36	21	0.172
Cleft palate	3	13	0.003*
Total	130	106	

*Significant at $P < 0.05$

Table 6: Distribution of sample according to family history

Type of cleft lip and/or palate	Frequency of patients (%)		Fisher's exact test
	Family history	No family history	
Cleft lip and palate	44	119	0.012*
Cleft lip	7	50	0.044*
Cleft palate	2	14	0.373
Total	53	183	

*Significant at $P < 0.05$

than that of the patients with family history ($P = 0.012$ and 0.044, respectively; $P < 0.05$), whereas for CP, no strong association to family history was observed.

Discussion

On the basis of Smile Train organization database, every year, as many as 8900 babies in Indonesia are born with a CL/P. More than 50% of patients do not get treatment because they do not know that the cleft can be repaired free of charge, there are even a number of underprivileged patients that only pay for their transportation fee to go to the hospital.[8] In Indonesia, there are organizations that specifically handle CL/P surgery for free, this organization is called Smile Train. Since March 2000, Smile Train has conducted free cleft operations for more than 38,000 patients in Indonesia.[9] Smile Train Indonesia operates through its partners of more than 66 foundations and hospitals.[10]

Observations carried out on the data from Yayasan Surabaya CLP Center provide results that cleft variation is divided into three types, namely CLP, CL, and CP, which is a type of non-syndromic cleft. This is in accordance with a study conducted by Moreira *et al.*,[11] in 2016, which states that basically the CL/P is divided into CLP, CL, and CP.

It was also known that the total incidence of CL/P in Yayasan Surabaya CLP Center, which has a scope of work in East Java province for 2017, was 236 cases. This number is not much different from the data reported by Yayasan Senyum Bali, which is also a partner of the Smile Train organization in Bali, which has a scope of work in Bali Province and has a total of as many as 244 patients with CL/P in 2017.[12] Unlike the number of events recorded in the 2017, CoRSU Hospital in Uganda reported 355 cases of patients with CL/P,[13] and 2017 The Cleft Registry and Audit Network database in the UK reported 1073 patients with CL/P.[14]

Similarities and differences in the incidence in each city or country can occur because data collection is not carried out on the same ethnic or racial type. The size of the facial process was related to the occurrence of CL/P because the size of the frontonasal process was in harmony with its ability to merge with other processes near it. A smaller frontonasal process similar to the ones found in Asians, which is the combination of a smaller or a more flat face with a broader upper face, and brachycephalic head can contribute to a higher CL/P level, whereas Africans with larger nose, imply that they also have a wider frontonasal process and palate, this can contribute to a lower incidence of CL/P.[15] The possibility of this difference occurs because the density of a country compared to other countries is different.

CLP cases were ranked first when it comes to the number of patients, namely as many as 163 cases, followed by CL with as many as 57 cases, and the last one, CP with 16 cases. This is similar to the results of a study conducted by Goto *et al.*,[16] in 2018 in Laos, which had the occurrence of CLP ranked first, followed by CL and finally by CP. Another research conducted by Yaqoob *et al.*,[17] in 2013 in Pakistan, found the incidence of CP higher than that of CLP and CL. The difference in incidence can occur because the incidence of CL/P could vary in each study, depending on inclusion criteria, case definitions, data sources, and selection bias.[18]

The variation of CL and CLP at Yayasan Surabaya CLP Center has fewer bilateral cleft cases than unilateral cleft cases, and the left-sided unilateral cleft occurs more than the right-sided ones. The incidence of laterality in Yayasan Surabaya CLP Center is supported by a study conducted by Nagase *et al.*,[19] in 2010, which also obtained results that found fewer bilateral cleft cases compared to unilateral cleft cases, and more left-sided unilateral cleft cases compared to right-sided ones. One reason for the different types of laterality in the cleft is that the development of facial arteries on the left side is slower than the right side but this has not been fully confirmed.[20]

Variations in CL/P at Yayasan Surabaya CLP Center were then divided based on gender, and the result for CLP type was 91 male patients and 72 female patients, that for CL type was 36 male patients and 21 female patients, and that for CP type was 13 female patients and 3 male patients. In the case of CLP and CL, the frequencies of patients were higher for males although not significant, whereas for CP, the frequency of patients was strongly associated

with females, this is in line with the conclusion expressed in many studies such as the ones by Martelli *et al.*[20] (2012), Agbenorku[5] (2013), and especially the one by Goto *et al.*,[16] in Laos, which has the same ethnicity as Indonesia, that is, Asians, stating that CLP and CL occur mostly in male.[19] On the contrary, CP was more prevalent in females than that in males, this result was in accordance with the research conducted by Nagase *et al.*[19] (2011) in Japan, which also had the same ethnicity as Indonesia and which was conducted on 184 patients with CL/P and showed a higher percentage of females experiencing CP than males.[20] As aforementioned, each type of cleft has a number of different cases for each gender, but the exact reasons that explain this incident have not yet been found. It was stated that female sex hormones may have an association and a role in increasing the incidence of CP.[15]

CL/P variation at Yayasan Surabaya CLP Center were divided based on family history. Most of CL/P patient did not have family history suffering CL/P. In the case of CLP and CL, the frequencies of the patients with no family history were significantly higher than that of the patients with family history, whereas for CP, no strong association to family history was observed. This is contrary to the research that has been carried out because usually this disorder is an inherited disorder. So, for the other patients in Yayasan Surabaya CLP Center who did not have a family history, it is likely that other causative factors, such as alcohol, drugs, or environmental factors, were responsible.[5,21]

There are limitations to this study. As mentioned earlier, this research was carried out at the Yayasan Surabaya CLP Center, where most of the patients with cleft came from East Java. Also, this research was only carried out on those patients with registration data recorded from January 1, 2017 to December 31, 2017. With that reason, it may limit generalizability of this study.

In conclusion, most types of CL/P cases at Yayasan Surabaya CLP Center were CLP, followed by CL and finally CP. The incidence of CLP and CL was more common in male patients, whereas CP was more common in female patients.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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