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Prevalence of Hypodontia in Saudi Arabia: A Retrospective Digital Orthopantomographic Study

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Authors' contributions

This work was carried out in collaboration among all authors. Author OAQ is a principal investigator in this study. Author OAQ designed the study and prepared the first draft of the manuscript. Authors AB, SHA, GIB, RA, EAAA, MA, AA and AJA managed the study design, data collection, statistical analysis, manuscript preparation process. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Hypodontia or Dental agenesis; is defined as a developmental missing of any teeth, excluding the last molars. It may befall as a genetic syndrome or as a non-syndromic isolated trait. However, there is no prevalence available in our city.
Aim and Objectives: The tenacity of this research is to assess the frequency of hypodontia among the population who received dental care at King Abdul Aziz University Dental Hospital in the city of Jeddah.
Study Design: Retrospective digital orthopantomographic: cross-sectional study.
Place and Duration of Study: Oral & Maxillofacial Prosthodontic Department, King Abdulaziz University, between January 2019 and July 2020.
Methodology: This research is a retrospective cross-sectional study based on the examination of an archival dental record and 2D panoramic radiographs of patients who are presented at King Abdulaziz University Dental Hospital, Jeddah. A total of 2045 records were reviewed and included in this study. Two general practitioners reviewed patient's dental charts looking for congenital missing tooth/teeth in a dark room by the method that the practitioners use. Careful reviews of each patient's record were done to ensure that the cause of the missing tooth/teeth were congenital and not surgical or traumatic. Data were gathered from dental records of patients' age period 6-9 years since most of the dental follicle of the permanent teeth should be completed or the tooth just erupts, radiographic findings were always compared to the patients' file and progress notes to ensure the causative factors of missing teeth. The data were recorded in an excel sheet which included gender, age, the type, area and counting of the missing teeth.
Results: After collecting the data, the total number of patients after exclusion were 1984. The prevalence of hypodontia in our tested population was %5.39. Statistical analysis were done by using SPSS software to correlate between variables. Varices grades.
Conclusion: Within the limitations of this study our data shows that the most common congenitally tooth agenesis is the second premolar %47.6 and the second most common congenitally missing tooth is lateral incisor %18.6.

Keywords: Hypodontia; dental agenesis; congenitally absent teeth; prevalence; epidemiology; incidence; dental anomalies.

1. INTRODUCTION

Determination and counting the teeth number is one of the important elements in evaluating patient's oral health in a dental clinic preceding to an intervention procedure. In general, there are many classifications of tooth agenesis: hypodontia, oligodontia, and anodontia that depends mainly on the number of non-formed teeth that fail to erupt during the early phases of tooth development, excluding the third molars [1]. Hypodontia is denoting absence of one or more teeth up to five; while oligodontia denote absence of six teeth or more but not fully absent; finally, anodontia denotes to the absence of the whole teeth [2].

Hypodontia is a very common term used to describe the deficiency in the development of one or more teeth [3]. In general, it is among the most common dental developmental anomalies in humanity; it may happen in combination with a syndrome or non-syndromic [1]. However, hypodontia may have an unfavorable impact on the individual's life quality where it can affect cosmetic appearances, chewing and grinding, speech and occlusal stability, because of undesirable occlusion as a result of the extrusion of opposing tooth or drifting of adjacent teeth toward the affected area depending on the number and location of missing teeth [2].

Aesthetic and function of the teeth will be affected especially in the cases of missing anterior teeth where agenesis of anterior teeth may result in diastema, drifting medial of teeth that are located distally to the missing tooth, the shift of teeth in the condition of a unilateral missing tooth. However, the treatment modalities of congenitally missing teeth is still challenging, and it needs a multidisciplinary team [4].

Excluding for the third molars permanent teeth, many studies have been reported that the frequency of hypodontia varieties from 1.6 to 6.9% but it is infrequent in primary dentition [1,4].

For example, Polder et al made a meta-analysis study and they found that European population had higher frequency of hypodontia associated with non-syndromic cases (4.6% males, 5.5% females) and while in the Australian population (5.5% males, 7.6% females) in comparison to Caucasians in Northern America (3.2% males and 4.6% females). From the literature, the lower second premolars in addition to the upper lateral incisors are most commonly affected after that the lower anterior and upper premolars [5]. Between European and Asian population, lower second premolars are the highest affected teeth followed by the upper permanent lateral incisors or upper second premolars in the European individuals [6]. In the Asian population, the lower and upper incisors and upper second premolars were the highest commonly affected teeth [7].

The prevalence of lack of teeth number appears similar in the literature between the upper and lower arches [1,5] and most of the cases were isolated or unilateral affecting tooth [1,8]. However, when we compared bilateral and unilateral tooth missing of the upper lateral incisors, we found that the bilateral incidence was more common than the unilateral, although the unilateral incidence was more common in the dentition [5].

The main causative factor is the genetic factor, many studies have reported that the frequency of such cases in the siblings [9,10]. There are controversial in the literature regarding the prevalence of hypodontia between genders, although it seems unsignificant tendency of tooth missing in females [11]. But a significant difference has been reported in women, with incidence 1.4 times higher than in men [5].

Hypodontia occurs more in non-syndromic cases, it may be related to the cleft lip with/without palate [12]. Several studies reported that hypodontia has been seen in many syndromes such as Down syndrome and ectodermal dysplasia. Recently, scientific information proposes that hypodontia shares some characteristics with certain kinds of malignancy [13].

Various studies have assessed the incidence of congenitally missing teeth between many populations and reported different outcomes. Recently, the literature proposes a rise in the prevalence of hypodontia [14], but there is no evidence about causative factors to this, it might be due to more advanced methods of diagnosis [1].

This research aimed to study the existing frequent and spreading of hypodontia among the permanent teeth except the last molars between the population who received dental care at King Abdul Aziz University Dental Hospital in the city of Jeddah. To define the highest impacted teeth and to associate our finding with the other populations investigated in the literature. Also, due to the deficiency in investigation about tooth missing congenitally in our population, such a study is required.

2. MATERIALS AND METHODS

2.1 Study Design and Data Collections

The study is a retrospective, cross-sectional observational study was conducted based on the examination of an archival dental record of patients who are presented at KAUDH, Jeddah. The preliminary sample consists of approximately 2045 orthopantographic images for patients their ages range between 6 and 8 years old, this study started in January 2019 to July 2020 and these images were taken within a 5-year from 2013 to 2018. Besides that, the orthopantograohic machines were with similar standardizing features for the entire two dimensions panorama.

In general, in our study, the inclusion standards for these investigations were Saudi Arabian patients who are medically free, with no history of medical issues or any syndrome. All of them should have good quality digital (full-mouth) orthopantomographic images. Their age should rage from six to nine old years since most of the dental follicle of the permanent teeth should be completed or the tooth just erupts. All selected files were inspected by two general practitioners who reviewed patient's 2D panoramic radiographs looking for congenital missing tooth/teeth. Data collections were done in the processing room through the image viewer to recognize the incidence of any deficiency of teeth number of patients.

A tooth was identified as congenitally agenesis by counting the number of teeth on orthopantomogram x-ray. The operators investigated all patients' records and the records had the following exclusion criteria: Presence of any syndrome or any history of systemic diseases, agenesis of third molars, extracted tooth due to decay processes, trauma, for

orthodontics requirements or for any reasons, radiographic x-ray for non-Saudi people, and bad panoramic radiographs.

After exclusion, the last group of this research included 1984 panoramic radiographs where data were obtained and recorded in an excel sheet e.g., date of birth, age when taking the radiograph, gender, the missing teeth area and numbers.

Data Statistical analysis was conducted using excel sheet and (SPSS version 23.0). The descriptive data were analyzed using mean, standard deviation and independent test.

2.2 Example of Radiographic Interpatation

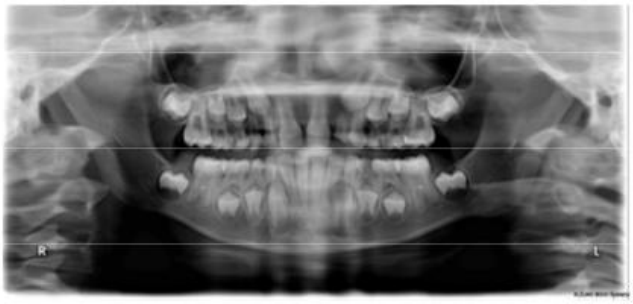

Plate 1. Patient age: 8 years old.
Congenital missing #12 and 22.
This case was included

Plate 2. Patient age: 8 years old.
Patient with syndromic hypodontia.
This case was excluded

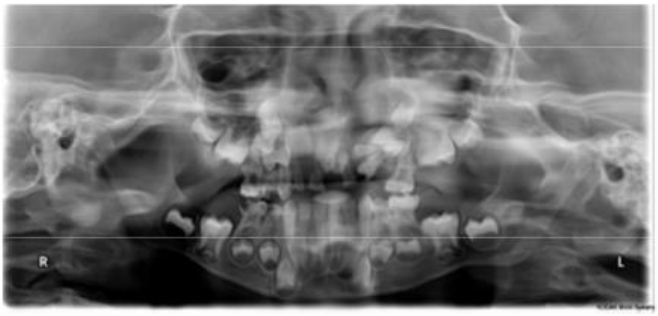

Plate 3. Patient age: 8 years old.
Patient has bilateral cleft lip and palate.
This case was excluded

3. RESULTS AND DISCUSSION

After collecting the data, the total number of patients after exclusion were 1984. The prevalence of hypodontia in our tested population was %5.39. Statistical analysis was done by using SPSS software to correlate between variables.

Prevalence of hypodontia according to the arch, upper arch was 58% and the lower arch was 42%.

Patients with hypodontia of each tooth in KAUDH according to the most common congenitally missing tooth orderly, Premolars, Lateral incisor, Canine then central incisor.

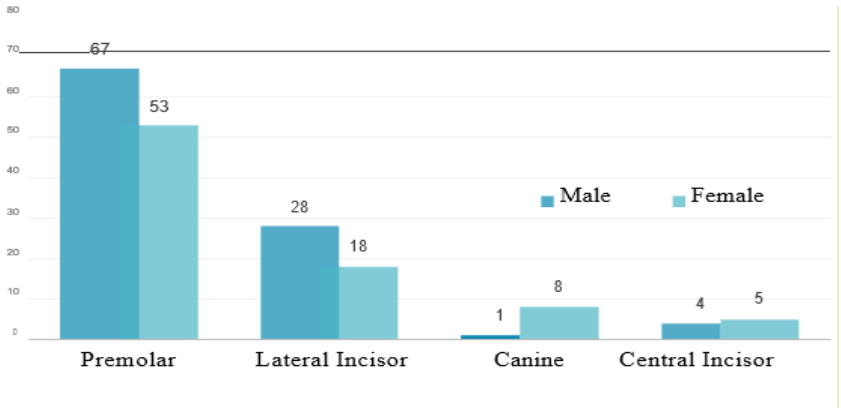

Fig. 1. Number of cases with hypodontia of each tooth in KAUDH with gender distribution

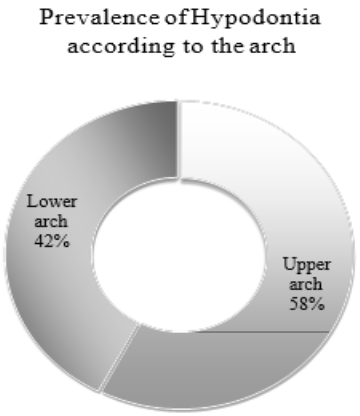

Fig. 2. Prevalence of Hypodontia according to the arch

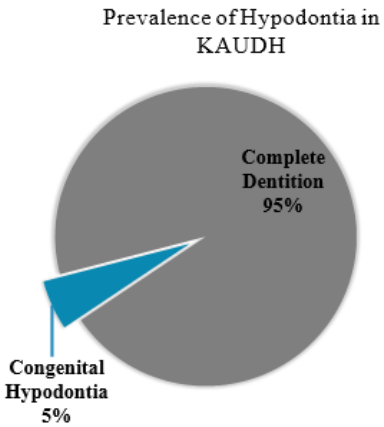

Fig. 3. Prevalence of Hypodontia in KAUDH

3.1 Discuusion

This research aimed to find out the frequency of hypodontia in Saudi patients who came to the dental clinic in KAU and to link our finding with those results from other populations. The developmental absence of teeth formation not including the third molars is known as hypoplasia. Furthermore, the incidence of hypodontia is high among the permanent dentition, while it is less frequent in the primary dentition [1-4]. There are many terms that have been used in the studies to define this disorder; like a deficiency in the teeth quantity, teeth congenitally missing, lack of teeth, agenesis or aplasia of teeth [15-17]. A different genetic stimulus on tooth development has confirmed that hypodontia cases were strongly related to the families with history of hypodontia [18]. However, other external factors have been reported as causative factors of hypodontia [19,20].

The frequency of hypodontia in the population has ranged between 0.1% and 0.9% of the population [15]. The finding of this study shows that the prevalence of hypodontia among 6 to 9 old years Saudi patients was 5.39%, which is considered lower than that known in other scientific investigations [21-23]. In disagreement to our finding, a high prevalence of hypodontia among German populations was reported in two studies (12.6%) [17]. and (11.3%) [21]. Further, the Japanese population was higher by 8.5% when compared to our study result [24]. However, our population finding was higher than that in Turkish populations by 4.6% [25].

Various researches stated a global estimate of the frequency of hypodontia between different populations, values of hypodontia prevalence ranged from 4.6 to 12.6% as observed in these studies [26-30]. Comparing our finding with the old researches is very limited because of wide varieties in the values of hypodontia prevalence beside the other cofactors.

In this research, the males show higher incidence of congenitally missing permanent premolar and lateral incisor teeth than females (67-28% males, 53-18% females), which is in contrast to most previous reports [18,30-32]. However, a study reported the equally distributed of hypodontia among German's females and males [17]. Still, the literature does not approve that.

When collate between the maxilla to mandibular arches, this study exhibited that hypodontia was further common in the upper arch (58%) than in the lower arch (42%). Dissimilar to study by Chung et al conducted in Korean community [26]. and study by Hassan et al conducted in Sudanese population [33]. Other researches display that the frequency of missing teeth is not the same from one racial community to another. The highest prevalence of congenitally missing teeth in our study were; the second premolar followed by lateral incisor, canine lastly the central incisors. However, study conducted by Hassan et al reported that the highest prevalence of genetically absent teeth were the maxillary lateral incisors (2.1%) followed by mandibular left second premolar (1.7%), mandibular right second premolar (1.3%), maxillary second premolars (1.2%), later followed by the mandibular lateral incisors (0.8%). The finding of this research edicts additional examinations to include other region of the Saudi population. As the result will be more informative. The data gained from such investigation will be valuable for the proper diagnosis and treatment planning.

4. CONCLUSION

Within the limitations of our study, we can conclude the following: the data shows that the prevalence of hypodontia in Saudi community was 5.39% which is considered low. Agenesis occurred more unilaterally than bilaterally. More investigations are required in the future to study the causative factors of hypodontia in Saudi Arabia.

CONSENT

It is not applicable.

ETHICAL APPROVAL

This survey study was conducted in the dental Department of Dentistry at King Abdelaziz University faculty dentistry (KAUFD), in Jeddah, Saudi Arabia in the year 2019 with an IRB number (003-01-19). The research procedure and protocol were accepted by the Ethical Committee of Human Research at the School of Dentistry-KAU, in Jeddah, Saudi Arabia.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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