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by Otty Ratna Wahjuni

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Distribution of dense bone island in the jaw through panoramic radiography based on gender and age

Otty Ratna Wahyuni^{1*}, Yunita Savitri¹, Sri Wigati Mardi Mulyani¹, Deny Saputra¹,
Ramadhan Hardani Putra¹, Rasendriya Chandramurti², Alquira Emalda Hardiva²

ABSTRACT

Objectives: Panoramic radiographs are used as a diagnostic tool adjunctive to oral examinations, treatment plans, and evaluation of treatment outcomes. This study was aimed to determine the distribution of Dense Bone Island (DBI) in the jaws through panoramic radiography based on gender and age.

Materials and Methods: The method used for this research is descriptive-observational. The research data used is secondary data with a total of 422 panoramic radiographic data of RSKGMP Airlangga

University patients.

Results: From a study of 422 secondary data found 253 (60%) patients with Dense Bone Island in the jaw, more commonly found in female, which is 162 (38.4%) in female patients and 91 (21.5%) in male patients. It was also found mostly in the age range of 17–25 years.

Conclusion: Dense Bone Island was found more in female than in male. It was also found to be more common in patients aged 17–25 years.

Keywords: Dense bone island, panoramic radiography, gender, age

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INTRODUCTION

Panoramic radiography is often used in dentistry because it presents images of the jaw, teeth, maxillary sinus, nasal fossa, and temporomandibular junction (TMJ) that can help support a diagnosis, treatment plan, and evaluation of treatment outcome. Panoramic radiographs are also used to view the presence of lesions, pathological conditions, and fractures of the jaw.¹ The greatest bone growth that enlarges in childhood to adolescence will continue to increase with age, peaking at around age 30 to 35 years. This causes different bone densities between age groups and genders. One of the lesions that can be found at this time is Dense Bone Island (DBI).²

A DBI is a radiopaque mass that is localized, well defined, and varies in size and shape. According to Chintala *et al.*, the diameter of DBI is 2 mm to 2 cm.³ DBI can also be referred to as idiopathic osteosclerosis, enostosis, or whorlbone.⁴ These lesions are asymptomatic and found incidentally during radiographic examination of the jaw, and are often confused with other pathological abnormalities of the oral cavity.⁵ DBI can affect surrounding tissues by causing internal root resorption, inhibiting eruption, and causing tooth displacement and other oral abnormalities such as impaction.⁶ In orthodontic treatment, it will cause inhibition of tooth movement when the orthodontic fixed appliance is activated. It will also cause disease in the periodontal tissue, which can

interfere with the process of closing the space (diastema).^{7,8}

DBI can occur or be found at any age, in any location, without a sex predilection and does not require treatment if there are no complaints.⁹ The differential diagnoses of DBI are condensing osteitis, periapical osseous dysplasia (POD), hypercementosis, and if there are 5 or more DBIs in the jaw, it indicates familial adenomatous polyposis.¹

Based on the description above, the authors conducted a study on the distribution of DBI in the jaws through panoramic radiographs based on gender and age at RSKGMP Airlangga University. The age groups used are based on the Indonesian Ministry of Health (2009), with groupings from toddlers to seniors. In this study, the age groups used were early adolescence (12–16), late adolescence (17–25), early adulthood (26–35), late adulthood (36–45), early elderly (46–55), late elderly (56–65), and old age (> 65).

The purpose of this study was to determine the distribution of DBI found on panoramic radiographs of patients in RSKGMP Airlangga University. With this result of study, the authors hope to inform a percentage of data regarding the distribution of DBI in the jaw based on gender and age group so it can be used in dentistry to help determine treatment plans and treatment prognosis.

¹Department of Oral and Maxillofacial Radiology, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia 60132

²Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia 60132

*Correspondence to:
Otty Ratna Wahyuni
✉ otty-r-w@fkg.unair.ac.id

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MATERIALS AND METHODS

This study uses a descriptive observational method using secondary data samples in the form of panoramic radiography soft files from patients at RSKGMP Airlangga University during the period 2018–2021. The inclusion criteria used consisted of male and female, all ages, with a DBI radiodiagnosis of the jaw, jaw with teeth, and panoramic radiographic quality according to quality evaluation. Exclusion criteria consisted of radiopacity in the presence of caries or extensive restorations, mixed radiopaque-radiolucent lesions, residual primary or permanent teeth, and edentulous regions. This study uses descriptive data analysis, whose results are presented in the form of tables and graphs with simple statistical calculations, in the form of the mode, or data that has the highest frequency and often appears in each gender and age group. This observation was carried out by 3 observers, 1 researcher and 2 supervisors. Laptop refer to the types of technology used during the observation. A DBI was observed and categorized according to gender and age group.

RESULTS

In this study, 422 panoramic radiographic data points were used, consisting of 156 male and 266 female data points. With the available data, 253 (60%) patients were found with DBI in the jaw. In

this study, the most DBI was found in the 17–25 year age group, or in late adolescence as shown in Table 1. DBI distribution was found to be 38.4% in female (162 patients) and 21.5% in male (91%). In age group calculations, the earliest age for DBI to be detected in the jaw was 13 years.

The age group used in this study was from early adolescence to the elderly. We found 5 patients with DBI in early adolescence (12–16), 71 patients with DBI in late adolescence (17–25), 59 patients with DBI in early adulthood (26–35), 49 patients with DBI in late adulthood (36–45), 47 patients with DBI in early old age (36–45), 24 patients with DBI in early old age (56–65), and 8 patients with DBI in the elderly (> 65) as shown in Figure 1.

The percentage comparison of 253 DBI findings in the jaw was 35% in males and 65% in females (Figure 2). Based on age group, the most data found were 46 female patients in the 17–25 year age group and the least data found was 0 on male patients in the 12–16 year age group (Figure 3).

DISCUSSION

This observation was carried out using secondary data in the form of 422 panoramic radiographs from 2018–2021 at the Dental Radiology Installation in RSKGMP Airlangga University by observing the presence of radiopaque lesions with DBI radiodiagnosis of the jaw. This observation was carried out by 3 observers (1

Table 1. Percentage results in males and females by age group

AGE GROUP (years)	MALE	FEMALE	TOTAL	PERCENTAGE
12-16	-	5	5	2%
17-25	25	46	71	28.1%
26-35	18	41	59	23.3%
36-45	19	30	49	19.3%
46-55	11	26	37	14.6%
56-65	13	11	24	9.5%
>65	5	3	8	3.2%
	91	162	253	100%

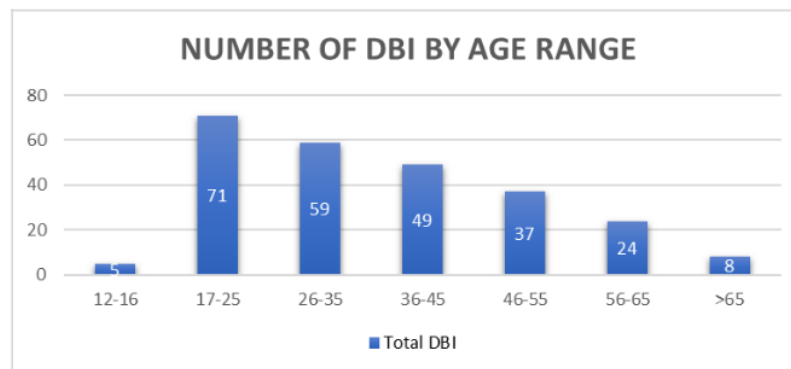


Figure 1. Total data by age group

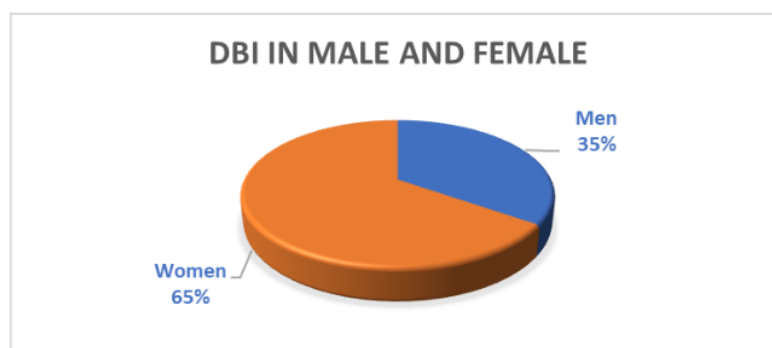


Figure 2. DBI in male and female

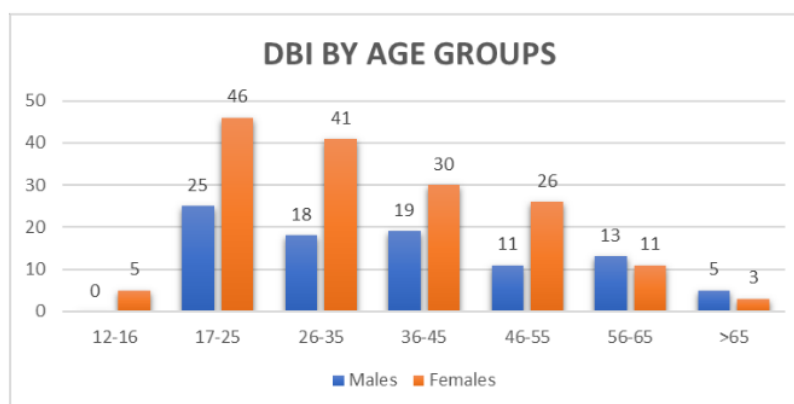


Figure 3. DBI in males and females by age groups

researcher and 2 supervising lecturers). In this observation, observers calculated the percentage of DBI distribution based on gender and age group in RSKGMP Airlangga University patients. From 422 panoramic radiographs consisting of 156 male patients and 266 female patients, the observations showed that 162 (65%) DBI was found in female patients and 91 (35%) in male patients. The results were found to be more common in female because bone density is influenced by hormones, and one of the main hormones is the hormone estrogen. Female produce more estrogen than male. This hormone can help to form and maintain bone mass.²

In this study, it was also found that DBI was mostly found in the age group of 17 to 25 years old. This is because at this age range, bone growth, bone modification, and bone density are still in good condition.¹⁰ Bone density in the age group of 5 to 16 years is lower than that of those aged 17 to 35 years, so it can be said that bone density will continue to increase with age. In this observation, it was found that with increasing age, the findings of DBI would decrease. This is because the greatest increase in trabeculae occurs in adolescence and will decrease during the maturation or adulthood and the bone remodelling in adulthood decreases.²

In the research conducted by Wang *et al.* regarding changes in the size of DBI, the results indicate that the size of DBI has a tendency to increase during adolescence and is stable or does not change in adulthood.¹¹ Other factors that can cause DBI are most commonly found in late adolescence or the age group of 17–25 years because at this age, orthodontic treatment is usually carried out, which prioritizes aesthetic reasons or psychosocial factors.¹² However, with the presence of DBI, orthodontic treatment can be obstructed because it can delay the tooth eruption and can hinder tooth movement during treatment.¹³ If there is no specific treatment to reduce the intensity of pressure on teeth moving along the cortical bone, tooth displacement can occur, and the risk of damage to the cementoblasts will increase with the possibility of more severe root resorption.⁷ Several cases of DBI found in samples aged over 65 years could be caused by the fact that during this period there was an increase in maximum bone mass and because these lesions were asymptomatic which led to a delay in detection.^{7,10,14}

DBI is more commonly found in the mandible than in the maxilla because the mandible receives a sufficient amount of blood supply, making it easy to form a bone mass.¹⁵ The mandible also has high

bone density and in the posterior region has a large masticatory pressure, causing DBI to be found more often in the mandible.¹⁰ From the data studied, the overall DBI (100%) was found in the mandible.

CONCLUSION

Based on the research that has been done, it can be concluded that the distribution of DBI in the jaw by panoramic radiography at RSKGMP Airlangga University is 60% of the 422 patient data. It was found more in females than in males, as much as 65%. It was mostly found in the 17 to 25 age group, with as much as 28.1%.

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FOOTNOTES

All authors have no potential conflict of interest to declare for this article. All procedures conducted were in accordance with the ethical standards.

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