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The comparison of the dental needs of patients from Poland and Ukraine aged 21-30 years old based on panoramic radiographs

Abstract

Introduction. Oral diseases are a serious problem of today's population. Amongst the leading causes of oral health diseases, untreated dental caries, edentulism and severe periodontal disease are identified. The condition of the oral cavity in patients aged 21-30 years varies depending on multiple factors, such as diet, lifestyle, hygiene of the oral cavity, availability of dental care and many others.

Aim. The aim of this study was to compare the dental treatment needs of young adults from Poland and Ukraine based on panoramic X-rays.

Materials and methods. The material was derived from the database of panoramic radiographs taken in the years 2017-2022 at the Department of Dental and Maxillofacial Radiodiagnostics.

Results. Mean number of teeth in patients from Ukraine and Poland was comparable. The mean number of teeth with fillings was higher in Polish patients.

The number of carious cavities in patients from Ukraine and Poland was similar. Both periapical lesions and teeth qualified for extraction were more frequently observed in Ukrainian patients.

The average number of impacted third molars per person was higher in Polish patients. The study took into account gender differences.

Discussion. The authors studied the intensity of caries in different age groups, the condition of periodontal tissues, and the incidence of retained third molars. Epidemiological studies were conducted to assess the oral health of patients of different nationalities and to analyze their attitudes toward oral health through a questionnaire.

Conclusions. The dental status of the studied Ukrainian and Polish patients shows no significant differences, unsatisfactory level of treatment and comparable dental needs.

Keywords: dental caries, dentistry in Ukraine, oral health, dental public health, educational status, dental hygiene.

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INTRODUCTION

The oral health status has a significant impact on a person's overall health, yet oral diseases are a serious issue in the contemporary population [1]. The World Health Organisation (WHO) estimates that globally, nearly 3.5 billion people (about 50% of the population) suffer from oral diseases [2]. Among the main causes of oral health concern are untreated dental caries (in both primary and permanent teeth), edentulism, advanced periodontal disease, oral cancer, and other conditions such as congenital malformations, traumatic dental injuries, and orofacial clefts [2]. It is a common infectious disease of the hard tissues, characterized by the demineralization of the tooth structure [2]. The highest number of cases of oral diseases are geographically observed in Southeast Asian countries and Western Pacific nations, due to high population density in those regions. According to WHO data, 2.4 billion people suffer from dental cavities in permanent teeth, and a staggering 621 million children experience cavities in their primary teeth. Poor hygiene is a significant contributing factor to oral diseases; only 53% of the population brushes their teeth twice a day, and merely 35% use fluoride toothpaste and brush for 2 minutes. The data collected through dental studies and surveys regarding the life and hygiene of the population [2].

The oral health status is plagued by issues faced by patients in both Poland and Ukraine. Among the dental problems of Ukrainian patients, we distinguish poor oral hygiene. Lack of regular hygiene can lead to many dental issues, such as dental caries and periodontal disease [3-5]. The most important challenges in Ukrainian dental care are availability, lack of funds for healthcare, and low quality of services.

Poland also faces difficulties in terms of oral health. Low levels of oral hygiene are still a significant hurdle among Polish patients. According to a study based on 2019 data conducted by the National Health Fund in Poland, about 90% of adults and around 65% of children aged 7-12 have dental caries [6]. According to Polish research, about 70% of adults have periodontal problems [4,6]. A significant difficulty among Polish patients is a high number of missing teeth. According to data, 70% of Poles aged 35 have at least one missing tooth [7].

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Missing teeth can cause problems with chewing and self-confidence. Many people are unaware of the importance of oral hygiene and its consequences. The most important problems in Polish dental care are accessibility, high costs, and a lack of medical specialists. The high cost of medical procedures, such as implants and prosthetic restorations, can pose further challenges [8].

The oral health status of patients aged 21-30 varies greatly as it depends on several factors, such as diet, lifestyle, oral hygiene, access to dental care, and many others. In this age group, patients are at risk of dental caries, especially if their diet is high in sugar and their hygiene practices are inadequate [9]. Regular brushing of teeth twice a day and regular dental visits can prevent dental caries [10]. Wisdom teeth erupt between the ages of 17 and 25 and can cause pain and other issues in that region of the oral cavity. Access to dental care can be problematic among young people as they are just beginning their careers.

A panoramic X-ray enables simultaneous visualization of all teeth, the jawbone, a portion of the maxillary bone, the hard palate, and the temporomandibular joints. It is a tomographic image in which a clearly selected layer is visible, while other structures outside the chosen focal through are either invisible or blurred. A panoramic radiograph is particularly necessary for assessing structures that cannot be visualized by intraoral images, such as the mandibular rami and the area of third molars. These images also enable us to determine the location, shape, density, and the impact of changes on surrounding structures. However, a panoramic radiograph also comes with several limitations, such as shadows and superimpositions that hinder accurate interpretation [11].

AIM

The aim of this study was to compare the dental treatment needs of patients from Poland and Ukraine aged 21-30 years based on panoramic X-rays.

MATERIALS AND METHODS

The material was derived from the database of digital panoramic radiographs taken in the years 2017-2022 at the Department of Dental and Maxillofacial Radiodiagnostics, Medical University of Lublin, Poland. Two panoramic units were used Vista VoxS (Duerr Dental) with S-PAN technology, operating at the following parameters 74 kV, 14.0 mA, 7s with pixel size 100 μm for men and 73kV, 14.0 mA and Orthophos SL 2D by Densply Sirona, operating at the following parameters 69kV, 16.0 mA, 14.1s. Orthophos SL 2D is equipped with DCS sensor and Sharp Layer technology, which produces a sharp layer of the entire examined area. The obtained radiographs were analyzed in the Vista Soft and Sidexis 4.0 software. In the examined period there were identified 353 panoramic radiographs of Ukrainian citizens. From this study group, we selected the biggest age group – females and males aged 21-30 years. There were 66 panoramic radiographs, with 61% from female patients and 39% from male ones. Patients from Poland were selected using permuted block randomization method. The study group comprised 43 females and 28 males aged 21-30 years. Consensus reading was performed by a second grade dentistry student from the Medical University of Lublin and resident of dentistry, members of the Student Research Group at the Department of Dental and Maxillofacial Radiodiagnostics, Medical University of Lublin, Poland. The obtained results were cross-checked by the supervisor, a dentist working for twelve years in the Department of Dental and Maxillofacial Radiodiagnostics.

The selection of panoramic X-ray was carried out in accordance with the inclusion and exclusion criteria. The inclusion criteria were as follows: good quality images, symmetrical position of the patient without motion artifacts and ghost shadows, and patients of both genders aged 21-30. The exclusion criteria were as follows: illegible images, artifacts and ghost shadows, and patients outside the 21-30-year group.

Evaluation of the condition of teeth was performed in compliance with the following criteria: number of teeth, number of dental fillings, caries possible to detect, periapical lesions, root canal treatment (RCT), dental disorders, periodontal diseases and condition of the third molar.

RESULTS

The results of the research were presented in Table1. The study took into account gender discrepancies (Table 2, Table 3).

TABLE 1. Comparison of the dental status of Ukrainian and Polish patients.

		Ukrainians	Poles
Number of patients		66	71
Mean number (maximal/minimal value)	teeth	30.258 (32/24)	30.380 (32/24)
	teeth with fillings	6.773 (24/0)	8.873 (21/0)
	teeth with caries	4.712 (14/0)	4.845 (15/0)
	teeth with periapical lesions	1.227 (9/0)	0.746 (8/0)
	teeth scheduled for removal*	0.970 (6/0)	0.535 (6/0)
	teeth after RCT	1.712 (10/0)	1.014 (6/0)
	impacted third molars	0.924 (4/0)	1.366 (4/0)
Percentage	teeth with correct RCT**	32.743%	41.670%
	patients with dental disorders	15.156%	19.718%
	patients with periodontal diseases	10.606%	5.630%

* teeth with crowns damaged by caries, caries reaching below the bone margin
** evaluation for canal filling to working length

TABLE 2. Comparison of dental status of Ukrainian and Polish female patients.

FEMALES		Ukrainians	Poles
Number of patients		40	43
Mean number (maximal/minimal value)	teeth	30.100 (32/24)	30.744 (32/28)
	teeth with fillings	6.775 (24/0)	8.860 (21/0)
	teeth with caries	4.275 (13/0)	3.953 (12/0)
	teeth with periapical lesions	1.075 (9/0)	0.465 (3/0)
	teeth scheduled for removal*	0.775 (3/0)	0.233 (3/0)
	teeth after RCT	1.625 (6/0)	1.000 (6/0)
	impacted third molars	1.225 (4/0)	1.465 (4/0)
Percentage	teeth with correct RCT**	32.308%	39.535%
	patients with dental disorders	17.500%	20.930%
	patients with periodontal diseases	12.500%	2.326%

TABLE 3. Comparison of dental status of Ukrainian and Polish female patients.

MALES		Ukrainians	Poles
Number of patients		26	28
Mean number (maximal/minimal value)	teeth	30.500 (32/24)	29.821 (32/21)
	teeth with fillings	6.654 (18/0)	9.536 (17/2)
	teeth with caries	5.385 (14/0)	6.250 (15/1)
	teeth with periapical lesions	1.462 (8/0)	1.179 (8/0)
	teeth scheduled for removal*	1.269 (6/0)	1.000 (6/0)
	teeth after RCT	1.846 (10/0)	1.036 (6/0)
	impacted third molars	0.538 (4/0)	1.214 (4/0)
Percentage	teeth with correct RCT**	37.500%	44.828%
	patients with dental disorders	11.538%	17.857%
	patients with periodontal diseases	7.692%	10.714%

DISCUSSION

Oral diseases are consistently a widespread issue across the world. Their prevalence is heavily dependent on the population's lifestyle factors, primarily diet and oral hygiene, but also on access to medical care, education, and individual economic status. Caries is a civilization disease, and we observe an increase in caries intensity with age. According to the study "Monitoring the Oral Health Status of the Polish Population in the Years 2016-2019" [6], in the age group of 3 to 18 years, regardless of the type of dentition, we see a twofold increase in caries intensity. At the age of 3, it was 41.1%, and at the age of 18, it reached as high as 93.2%. Regarding deciduous teeth in the period from 3 to 7 years, we notice over a twofold increase in caries intensity, from 41.1% to 85.1%. Analyzing mixed dentition in the period from 5-10 years, we observe a 9.5% increase in caries intensity, from 76.8% to 86.3%. In the permanent dentition, from the age of 12 to 18, we observe an 18.3% increase in caries intensity, which is almost a twofold increase compared to the mixed dentition. This is related to a higher number of teeth in the oral cavity. In the population aged 35-44, we see a noticeable decrease in caries intensity. The DMFT value was 15.5 in 2010, while in 2017 it was 7.0. In the population aged 65-74, the percentage of edentulous individuals was 40.8% in 2009, and it decreased to 18.8% in 2019. The DMFT index for this age group remains steady at 25-24.9. The condition of periodontal tissues was assessed based on the presence of inflammation, indicated by gum bleeding. It was observed that the frequency of bleeding increases with age, from 7.3% at the age of 3 to 30.9% at the age of 18. Therefore, gum inflammation occurs more frequently in permanent dentition than in primary and mixed dentition. At the age of 12, gingival pockets with a depth of 4.5mm begn to appear. Dental calculus was present in 22.2% (age 12) to 36.9% (age 18) of teenagers. Healthy periodontal tissues were found in 74% of 15-year-olds and 68.8% of 18-year-olds. In the population aged 35-44, the number of individuals with healthy periodontal tissues increased over the years (2010 – 1/4 of the population, 2020 – 2/3 of the population), while the number of individuals with more severe periodontal disease changes also increased. In the age group of 65-74, the percentage of individuals with healthy periodontal tissues was 25% in 2019. Unfortunately, a high percentage of individuals with periodontal pockets requiring treatment is also observed [6].

Epidemiological studies were conducted to assess the oral health status of Poles in different age groups and various provinces within the country. Children aged 3 to 18 years (3, 5, 6, 7, 10, 12, 15, 18 years) and adults in the age groups of 35-44 and 65-74 were examined. Within each province, one county, municipality, city, and village were randomly selected; if the number of individuals was insufficient, additional random selection was performed. Clinical examinations were carried out according to WHO criteria and objectives. The studies were conducted under uniform conditions using artificial lighting, WHO probes, and mirrors. The oral health status of the examined individuals was assessed based on an examination card, which included: the status of caries – the DMFT index, the state of gums and periodontium – the CPI index, prosthetic status, and the presence of pathological changes in the oral mucosa [6].

A worrisome fact is that the majority of the population over 50 years old requires dentures. According to WHO data from 2020, the incidence rate of oral and lip cancers is 4.5 [11].

Analyzing the results of our research, we notice a difference in the number of filled teeth between patients from Ukraine and Poland. In patients from Poland, this number is higher (8,873) than in patients from Ukraine (6,773). Periodontal diseases are the second most common oral cavity disease. The conducted study shows that 10.606% of patients from Ukraine have periodontal issues, nearly twice the prevalence observed in patients from Poland (5.63%). This could be attributed to the political situation in Ukraine. The outbreak of war has hindered free access to medical care and oral hygiene resources.

According to data from 2018 gathered by Pawłowicz et al. [12], as much as 16.5% of Poles below the age of 34 experience bleeding during probing, and only 21.2% of individuals have healthy periodontium.

Third molars erupt between the age of 17 and 25. The results of our study show that the frequency of impacted third molars is high in both patients from Ukraine (0.924) and Poland (1.366). According to studies by other authors, especially Górski et al., the prevalence of impacted third molars ranges from 16.7% to 66.86%. They can cause inflammatory dental diseases characterized by pain and swelling of infected teeth, and they can also damage adjacent teeth and bone [13].

According to the WHO report, there is a lack of up-to-date data on the oral health status of European patients, as data collection systems do not usually include external measurements or data on oral health care use. The Health Systems in Transition (HiT) series provides country reviews detailing health system and policy reforms and initiatives. Oral problems were observed in the highest percentage of patients from Croatia, Slovenia and Romania, while the lowest percentage of patients from the United Kingdom, Spain and Ireland [14].

Sunstar commissioned its worldwide consumer awareness survey of oral health and dental care and created Healthy Thinking Report 2021.

A questionnaire was carried out to represent patients' attitudes towards oral health. The prevalence of problems is high, with half of the respondents reporting 1-10 dental fillings and 22% indicating a diagnosis of gum disease. The lowest percentage of patients with oral problems was in Germany (45%),

closely followed by patients from the UK and the Netherlands. This was associated with frequent visits to the dentist. The highest level of dental caries was in Indonesia (48%), which has an unfavourable dentist-to-population ratio [15].

The conducted study has certain limitations: the number of examined patients was relatively low, it does not take into account patients' medical history and treatment information, and panoramic imaging is not a perfect diagnostic tool. Moreover, not many studies addressing the oral health of patients from Ukraine have been published. Therefore, further research in this area is necessary.

FIGURE 1A. The panoramic radiograph of the Ukrainian patient shows missing teeth 16, 14, 22, 26, 36 teeth 11, 12, 13, 17, 21, 24 with root canal treatment, numerous fillings and carious cavities.

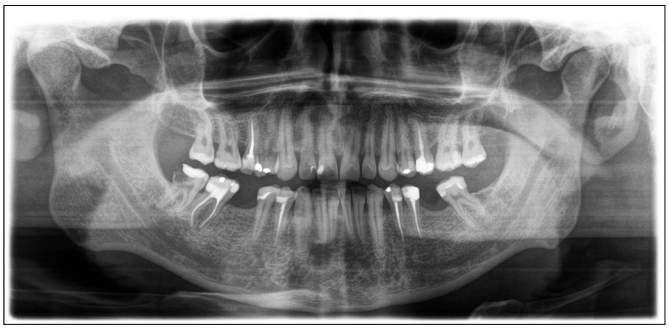

FIGURE 1B. Panoramic radiograph of a patient from Poland shows missing teeth 36 and 46, teeth 15, 25, 34, 35, 44, 47 with root canal treatment.

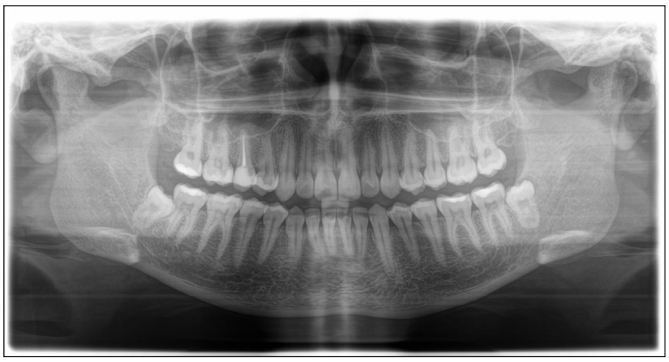

FIGURE 2A. Panoramic image of a patient from Poland shows impacted third molars in the alveolar region of the mandible.

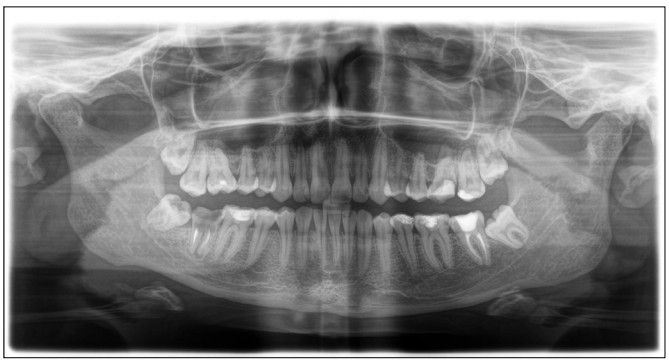

FIGURE 2B. The radiograph of Ukrainian patient shows four impacted third molars.

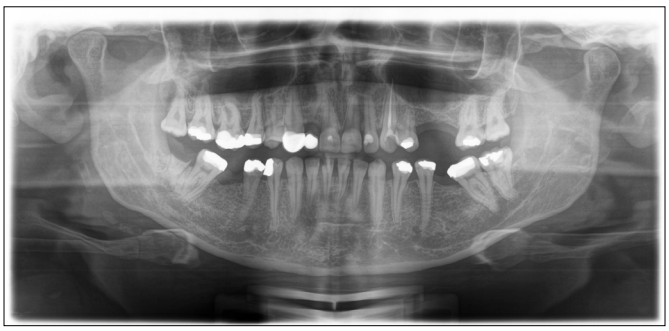

FIGURE 3. Panoramic radiograph of a patient from Poland shows the root of tooth 48 with extraction indications.

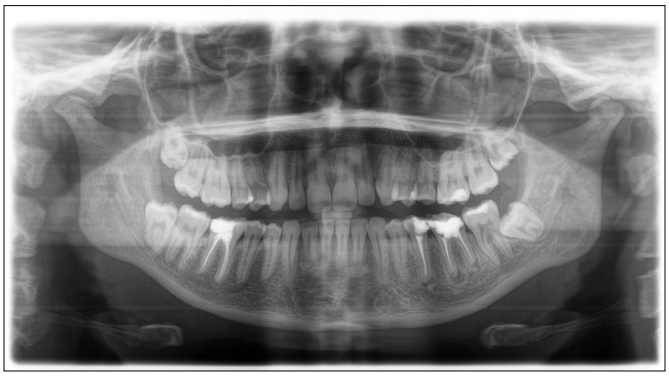

FIGURE 4. Panoramic X-ray of a patient from Ukraine shows periapical lesions - granuloma of endodontically treated teeth 35, 36.

FIGURE 5. Panoramic image of Ukrainian patient shows deep caries in teeth 16, 26, 38 teeth 26, 37, 48 with incorrect RCT, missing teeth 27, 36, 46, 47 in the area of tooth 36 overfilling material after RCT, left in the alveolar bone of mandible.

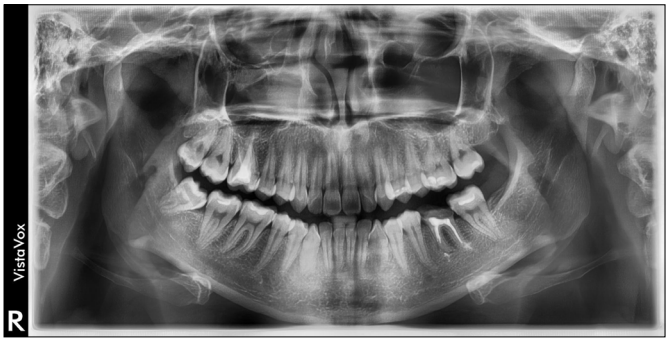

FIGURE 6A. Panoramic radiograph of Ukrainian patient with improper RCT of teeth 16, 36.

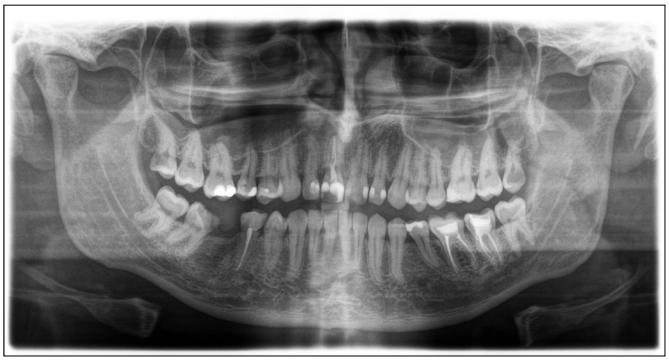

FIGURE 6B. Panoramic X-ray of Polish patient with nonhomogeneously filled root canal in tooth 11, overfilled root canals in teeth 36, 37 tooth 45- correct RCT.

CONCLUSIONS

Taking into consideration limitations of panoramic radiographs, the dental status and treatment needs of the studied Ukrainian and Polish patients based on panoramic radiographs are comparable.

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