

ORIGINAL ARTICLE

THE IMPORTANCE OF THE TOTAL EDENTULOUS PROSTHETIC FIELD MORPHOLOGY IN THE DESIGN OF CONVENTIONAL COMPLETE DENTURES

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Abstract: *Introduction.* The complete denture has the role of reproducing the missing dental and maxillary structures: teeth, gums and facial contours, ensuring a harmonious integration with the patient's remaining features. The main *objective* of this study aims to evaluate the knowledge of dental students and dentists regarding complete denture. *Material and method.* The evaluation of the knowledge among students and dentists regarding the prosthetics of the complete edentulism was carried out by the questionnaire method. The study was attended by students of the Faculty of Dental Medicine of the University of Medicine and Pharmacy, Craiova and dentists, from the urban environment. *Results.* Regarding the sources of information, 26% of the participants mentioned that the main source of information was represented by specialized books, 86% of the participants believed that the patient's general state of health influences the morphology of the total edentulous prosthetic field. 74 of the participants stated that the installation of the "suction cup" phenomenon between the mucosal face of the prosthesis and the fully edentulous prosthetic field is the main factor for achieving the suction of the complete denture. 44% of the respondents considered that the main factor contributing to the stability of a complete denture is the anatomical retentiveness *Conclusions.* The complete denture plays an essential role in the restoration of the dento-maxillary system by ensuring the morphological and functional rehabilitation of totally edentulous arches.

Keywords: complete denture, edentulism, questionnaire.

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1. Introduction

Complete edentulism represents an important pathological condition of the dento-maxillary system, defined by the absence of all teeth in one or both arches and negatively influences the functionality of the other components of the ADM such as the articular, muscular, intraoral tissue and self-maintenance [1]. Another problem encountered, and perhaps the most important for the totally edentulous patient, is the psychological impact on the quality of life [1].

Alteration of the facial appearance is not only caused by the loss of teeth, but also by the process of bone resorption, by changes in the dynamics and tone of the perioral muscles, as well as by the age, usually older, of these patients [1]. Facial muscles can lose some of their tone through the aging process, but the loss of tone can also occur because the muscles cannot work as efficiently as before.

The total edentulous prosthetic field represents the totality of the structures that come into direct contact with the mobile prosthetic works and participate in their maintenance, support and stability. Total edentulism is defined as the absence of all teeth in one or both jaws. It can be unimaxillary, when only the maxilla is of interest (total maxillary/mandibular edentation) or bimaxillary [1].

For the replacement of dental units lost by a totally edentulous patient during his life, making a conventional complete denture can be an effective and fast therapeutic solution.

The complete denture has the role of reproducing the missing dental and maxillary

structures: teeth, gums and facial contours, ensuring a harmonious integration with the patient's remaining features. Thus, in a totally edentulous patient, the mobile prosthesis helps to restore the functions: masticatory, phonetic, physiognomic, digestive and psychological. In addition, total prostheses effectively contribute to restoring the natural appearance of the face, allowing patients to regain their confidence and self-esteem [2].

Restoring the loss of tissues, therefore the support of the lips and the fullness of the cheeks are limited in the case of oral rehabilitation with the help of complete denture, which can even contribute to the appearance of premature aging in edentulous patients.

In Romania, total edentulism still represents an important health problem that is widespread and that requires a fast and effective prosthetic treatment. Currently, the number of total edentulous cases is increasing in rural areas, as a result of the countless disadvantaged environments where access to education and health is limited, and material possibilities are also restricted [3].

In the UK, patients who had lost their remaining teeth in the past 10 years, 59% said that they only visited the dentist when they had problems, while 29% said they visited the dentist regularly. This pattern of presence was almost completely opposite to those patients who still had their teeth [4].

According to Slade et. al, in the United States, in a study in which 432,519 adults were surveyed, it was concluded that among adults over the age of 15, the prevalence of

edentulism was 4.9% [5]. In Canada, the overall edentulous rate in 2010 was 6.4% to 21.7% among adults aged 60 to 79 years [6].

The main objective of this study aims to evaluate the knowledge of dental students and dentists regarding complete denture.

2. Materials and method

The evaluation of the knowledge among students and dentists regarding the prosthetics of the complete edentulism was carried out by the questionnaire method. The studied material was represented by the answers to the questionnaire questions given by the study participants.

The study was attended by students of the Faculty of Dental Medicine of the University of Medicine and Pharmacy, Craiova, of both genders, Romanians and foreigners, and dentists, of both genders, from the urban environment.

The questionnaire included a number of 15 questions:

- questions regarding the category of participants: professional category, age, gender, seniority;
- a question about information sources;
- questions related to the topic discussed: questions about the factors that influence the morphology of the prosthetic field, questions about the maintenance, support and stability of a total prosthesis;
- a question about training the patient regarding the use of the complete denture.

The questionnaire was uploaded in Google Forms and distributed online in social media in dental groups. Each question had several answer options, the participant having the opportunity to choose the answer he considered correct.

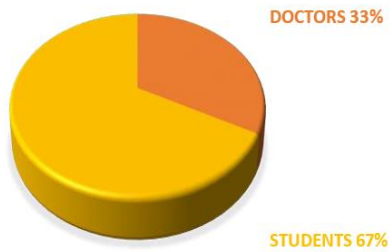
The results of the questionnaire were centralized and statistically processed through descriptive statistical analysis.

The study was conducted after obtaining informed consent from all participants regarding the objectives and method of conducting the study, in compliance with the Declaration of Helsinki. Scientific Ethics and Commission of UMF Craiova approval (no. 59/29.01.2024) was obtained in advance.

3. Results

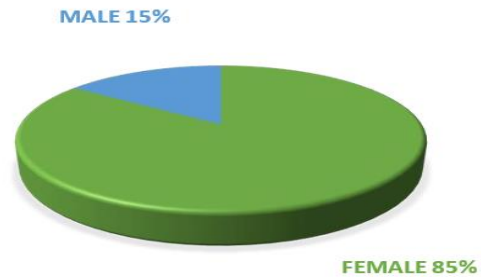
To the questionnaire about the knowledge assessment of the treatment of total edentulism, 79 participants responded to the questionnaire, of which 53 were students of the Faculty of Dental Medicine in Craiova, Romania, and 26 were dentists from Romania and the Republic of Moldova (Figure 1a), 85% (n=67) were female and 15% (n=12) male (Figure 1b), 75% belonged to the 20-29 age group (Figure 1c), 42,5% of the doctors had a working experience between 0-5 years and 47% of the students were enrolled in the 6th year of study (Figures 1d. and Figure 1e.). Regarding the sources of information, 26% of the participants mentioned that the main source of information was represented by specialized books (Figure 1f).

DISTRIBUTION OF PARTICIPANTS BY PROFESSIONAL CATEGORY



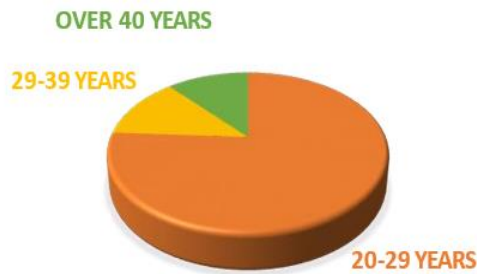
(a)

DISTRIBUTION OF PARTICIPANTS BY GENDER



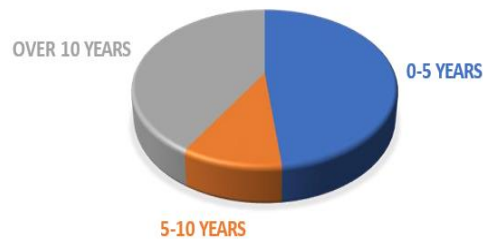
(b)

DISTRIBUTION OF PARTICIPANTS BY AGE



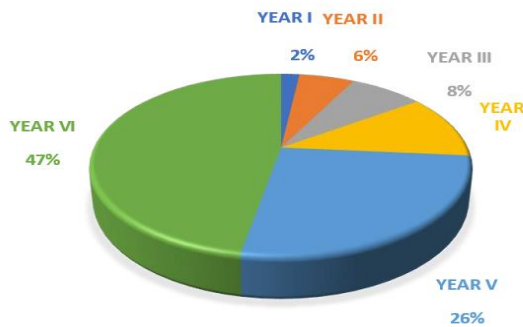
(c)

DISTRIBUTION OF DOCTORS IN RELATION TO EXPERIENCE



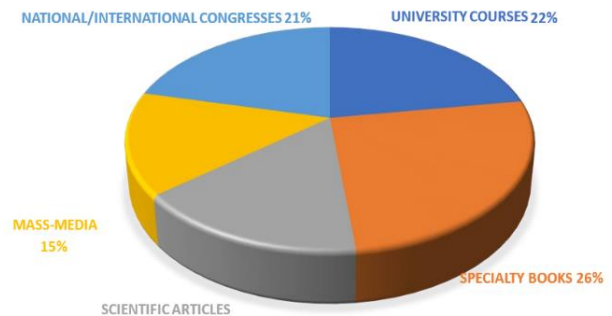
(d)

DISTRIBUTION OF STUDENTS BY THE YEAR OF STUDY



(e)

DISTRIBUTION OF PARTICIPANTS BY INFORMATION SOURCES



(f)

Figure 1. Distribution of the study group. (a) Distribution of participants by professional category; (b) Distribution of participants by gender; (c) Distribution of participants by age; (d) Distribution of doctors in relation to experience; (e) Distribution of students by the year of study; (f) Distribution of participants by information sources.

97.5% (n=77) of the participants considered that the patient's age and gender influence the morphology of the total edentulous prosthetic field (Figure 2a) and that the etiology of complete edentulism can

influence the morphology of the total edentulous prosthetic field (Figure 2b).

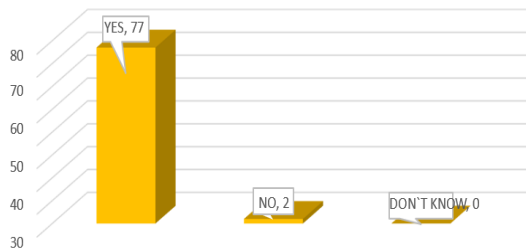
86% (n=68) of the participants believed that the patient's general state of health influences the morphology of the total

edentulous prosthetic field, and 5.1% (n=4) of them have no knowledge of these aspects (Figure 2c).

Among the 79 participants, 52 considered that vertical forces are the main

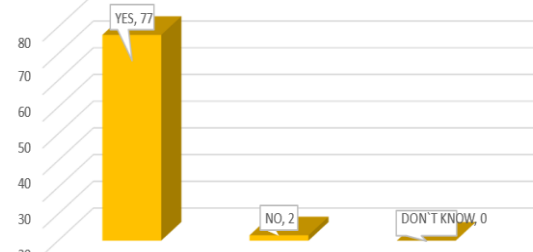
categories of forces that act on a complete denture and 51 took into account occlusal pressures (Figure 2d).

DISTRIBUTION OF PARTICIPANTS BY THE INFLUENCE THAT THE AGE AND GENDER OF THE PATIENT HAVE ON THE MORPHOLOGY OF THE TOTALLY EDENTED PROSTHETIC FIELD



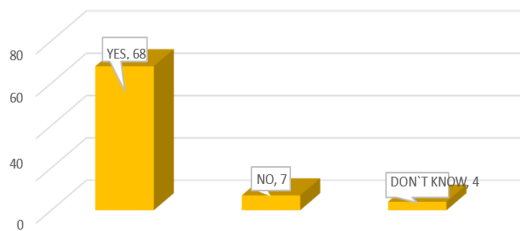
(a)

DISTRIBUTION OF PARTICIPANTS BY THE OPINION REGARDING THE INFLUENCE OF EDENTATIONAL ETIOLOGY ON THE MORPHOLOGY OF THE TOTALLY EDENTED PROSTHETIC FIELD



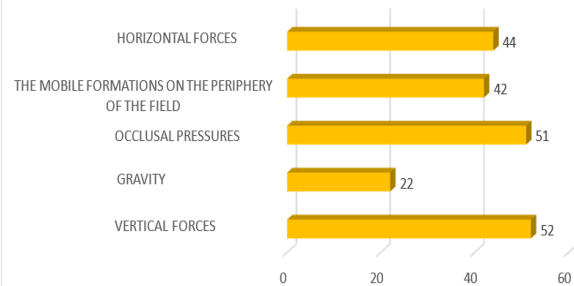
(b)

DISTRIBUTION OF PARTICIPANTS BY THE KNOWLEDGE ABOUT GENERAL HEALTH STATUS ON THE MORPHOLOGY OF THE TOTALLY EDENTATE PROSTHETIC FIELD



(c)

DISTRIBUTION OF PARTICIPANTS BY THE OPINION ON THE MAIN CATEGORY OF FORCES WHICH ARE ACTING ON THE TOTAL PROSTHESIS



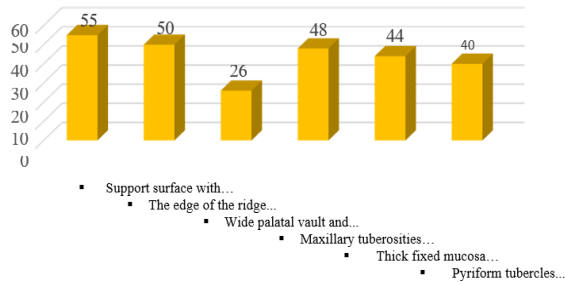
(d)

Figure 2. Distribution of the study group. (a) Distribution of participants by the influence that the age and gender of the patient have on the morphology of the totally edentulous prosthetic field; (b) Distribution of participants by the opinion regarding the influence of etiology of edentulism on the morphology of the totally edentulous prosthetic field; (c) Distribution of participants by the knowledge about general health status on the morphology of the totally edentulous prosthetic field; (d) Distribution of participants by the opinion on the main category of forces which are acting on the total prosthesis.

In the questionnaire, both doctors and students were asked "What are the main factors with a role in supporting a complete denture?". It is observed that 55 of the participants considered the support surface

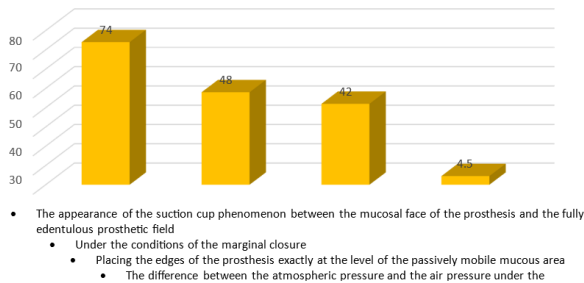
with large dimensions, the main factor for the adhesion to be achieved, and 50 participants considered the well-represented edentulous ridges as the main factor (Figure 3a).

DISTRIBUTION OF PARTICIPANTS ACCORDING TO THE OPINION ON THE MAIN FACTORS WITH ROLE IN THE SUPPORT OF TOTAL PROSTHESIS



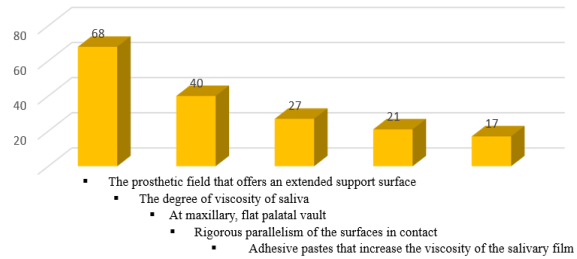
(a)

DISTRIBUTION OF PARTICIPANTS ACCORDING TO THE KNOWLEDGE OF PERFORMING SUCTION OF TOTAL PROSTHESIS



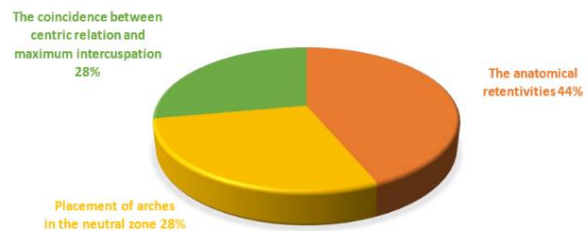
(c)

DISTRIBUTION OF PARTICIPANTS ACCORDING TO THE KNOWLEDGE OF ACHIEVING THE ADHESION OF A TOTAL PROSTHESIS



(b)

DISTRIBUTION OF PARTICIPANTS ACCORDING TO THE KNOWLEDGE ABOUT THE STABILITY OF A TOTAL PROSTHESIS



(d)

Figure 3. Distribution of the study group. (a) Distribution of participants according to the opinion on the main factors with role in the support of total prosthesis; (b) Distribution of participants according to the knowledge of achieving the adhesion of a total prosthesis; (c) Distribution of participants according to the knowledge of performing suction of total prosthesis; (d) Distribution of participants according to the knowledge about the stability of a total prosthesis.

To the question "What factors contribute to achieving the adhesion of a complete denture?", 68 of the participants considered that a prosthetic field that offers an extended support surface contributes to the achievement of the adhesion of a complete denture (Figure 3b). To the question "Which of the following factors contribute to the suction of a complete denture?" 74 of the participants stated that the installation of the "suction cup" phenomenon between the mucosal face of the prosthesis and the fully edentulous prosthetic field is the

main factor for achieving the suction of the complete denture (Figure 3c). 44% of the respondents considered that the main factor contributing to the stability of a complete denture is the anatomical retentiveness, 28% considered that the placement of the arches in the neutral zone ensures the stability of the prosthesis and 28% chose the coincidence between the centric relationship and the maximum intercuspation as the main factor which ensures the stability of the complete denture in the prosthetic field (Figure 3d).

Both doctors and students felt that the patient needed special instructions to wear the complete denture (Figure 4).

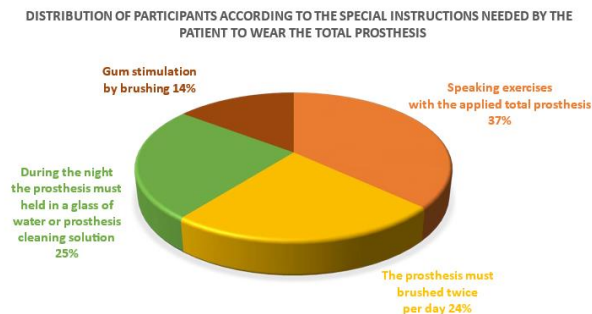


Figure 1. Distribution of participants according to the special instructions needed by the patient to wear the total prosthesis.

37% of the participants considered that speech exercises with the applied complete denture are a special instruction for the patient, and 25% considered keeping the complete denture during the night in a glass of water or cleaning solution as a special instruction.

4. Discussions

The aim of the study was to evaluate the knowledge of students and practicing dentists about the importance of the morphology of the fully edentulous prosthetic field in prosthetics. It should be noted that 67% of the respondents were students, but only 47% of them were enrolled in the 6th year of study. This result indicates that the interest in the topic addressed has increased among the students who are in

the middle of the study process. The theme did not have a high impact among doctors, although they face this problem in current dental practice.

An interesting aspect is the fact that only 26% of the participants mentioned specialized books as the main source of information on the studied topic. The other information options chosen were: university courses, national and international congresses, mass media and scientific articles, the first three involving audio-visual means. Almost all participants considered that the morphology of the prosthetic field is influenced by age, gender and the etiology of total edentulism. The total loss of teeth is related not only to age, but also to other variables, such as social class and marital status. When multivariate analyzes were undertaken, any association between tooth loss and gender disappeared. The differences that are evident in Britain can be illustrated by comparing the extremes. To quote from Steele et al. (2000), women from an unskilled manual background living in Scotland were 12 times more likely to be totally edentulous than men from a non-manual background in southern England [4, 7]. More than 80% of the respondents appreciated that the morphology of the totally edentulous prosthetic field varies depending on the general state of health of the patients. It should also be taken into account that complete edentulism has a strong negative impact on the patients' quality of life, expressed by the loss of functional abilities, such as mastication and phonation, as well as nutritional, aesthetic and psychological losses, with a direct influence on reducing self-esteem and social integration [8-11]. According to the opinion of approximately 65% of the respondents, vertical forces and

occlusal pressures are the main categories of forces that act on complete denture. In the case of an unstable complete denture on the prosthetic field, it is possible to reduce the maximum intercuspation forces. Due to disuse atrophy, the muscles of the dento-maxillary system can lose their tone in such cases [12]. The weakening of the jaw muscles, resulting in such situations, can further reduce the maximum forces that occur during mastication, being a vicious circle. This effect is more pronounced in patients who are long-term wearers of conventional complete dentures and, more so, unstable lower complete dentures [13, 14].

Regarding the retention of the complete denture through adhesion, more than 50% of the participants considered that the support surface of the prosthesis or the well-represented edentulous ridges play an important role. Almost all of the respondents considered that the appearance of the "suction cup" phenomenon between the mucosal face of the prosthesis and the fully edentulous prosthetic field is important for achieving the maintenance of a complete denture through suction. Retention of a complete denture depends on both under-pressure and adhesion to the underlying tissue [15]. When a good peripheral seal exists, between the base of the complete denture and the mucosa of the fully edentulous prosthetic field, under-pressure will appear. Peripheral sealing represents the close contact between the marginal surface of the complete denture and the oral mucosa. [16]. The survey indicated that 44% of the participants considered that anatomical

retentiveness is the main factor involved in the stability of a complete denture, but 56% appreciated that functional factors such as the placement of the arches in the neutral zone and the coincidence between centric relation and maximum intercuspation are the factors that contribute significantly to the stability of the complete denture. It is of fundamental importance to remember that tooth extraction does not simply mean losing visible crowns. With the loss of the roots, the alveolar bone, implicitly the anatomical retentivities, undergo the processes of bone resorption and atrophy. Although it is relatively simple to provide an effective replacement for dental crowns by means of a prosthesis, it is often difficult, if not impossible, to remedy the problem of resorbed alveolar bone; the more bone is resorbed, the bigger the problem [4].

It is suggested that the later stages of resorption are likely to be influenced by factors such as age, nutrition, drug therapy (eg corticosteroids) and hormonal factors. There is also the view that severe resorption, particularly of the mandible, is influenced more by systemic factors than by local factors [17].

With the passage of time and implicitly the technological advance, numerous branches of dentistry have contributed to establishing the diagnosis in complete edentulism and the principles and optimal treatment methods for this condition. Moreover, even though at the present time the therapeutic possibilities in dentistry have seen a remarkable technological advance, according to the previously mentioned data, many patients

become totally edentulous at the age of over 65 in well-developed countries.

5. Conclusions

The complete denture plays an essential role in the restoration of the dento-maxillary system by ensuring the morphological and functional rehabilitation of totally edentulous arches. The survey highlighted the fact that the participants in the study considered that

the morphology of the prosthetic field is influenced by age, gender and general state of health. They also appreciated that the retention, support and stability of a complete denture are influenced by adhesion and anatomical retentiveness. The success of edentulism therapy through conventional complete denture depends on the level of specialist knowledge.

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Author contributions

Authors read and approved the final manuscript. All authors have equally contributed to this work.

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Conflict of interest statement

The authors declare no conflicts of interest concerning this study.

Data availability statement

Will be provided on request.

Ethics statement

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