



Impression Materials Used in Fixed Dental Prosthesis: A Study within Private Practice Dentists in Casablanca, Morocco

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Abstract

Background: To achieve a fixed prosthesis that is well integrated into the oral environment, the impression for a fixed prosthesis must precisely reproduce the appropriate dental preparation and the sulcular region. To obtain an accurate impression, impression materials and auxiliary equipment must be chosen carefully according to clinical conditions. The aim of this article was to determine the various impression materials and the factors influencing their choice, the types of impression trays, as well as the practice of decontaminating impressions by private sector dentists in Casablanca, Morocco. **Methods:** A descriptive epidemiological cross-sectional study was conducted over a period of about 5 months from October 2022 to March 2023 using a questionnaire distributed to 262 dentists. **Results:** The most used impression materials were condensation cured silicone (68.7%) followed by addition cured silicone (65.6%). The most used type of impression tray was the perforated tray (88.5%), followed by the metal tray (78.6%). Regarding the practice of impression decontamination, decontamination before sending to the dental technician was 91.2%, with dentists always performing decontamination in 71.1% of cases, the most used decontaminant being water (65.4%). **Conclusion:** This study determined the different impression materials frequently used in fixed prosthetics, as well as the criteria for their choice, the type of impression tray required, and the type of impression decontaminant used by private-sector dentists in Casablanca.

Subject Areas

Fixed Dental Prosthesis, Private Practice

Keywords

Dental Impression, Dentist, Fixed Prosthodontics, Impression Tray, Preliminary Impression

1. Introduction

Taking an impression is a crucial step in the process of producing dental prostheses. The preliminary impression, or study impression, is used to replicate part of the patient's oral cavity to facilitate the observation and study of their dental arches. Models derived from this dental impression can be moved using an articulator, thus deepening the case analysis. As an additional examination, the preliminary impression helps to establish an accurate diagnosis of the clinical case and to conceptualize a personalized treatment plan for each patient.

To achieve a fixed prosthesis that is well integrated into the oral environment, the impression for a fixed prosthesis must precisely reproduce the appropriate dental preparation and the sulcular region. The success of the impression-making process is multifactorial, involving the choice of impression materials and auxiliary equipment suited to the clinical circumstances. To obtain an accurate impression, choices must be tailored to the clinical conditions.

Many studies have suggested using newer elastomeric materials for final impressions to replace older and more traditional materials. The newer materials have better mechanical and physical properties [1] [2].

The aim of this article was to determine the different impression materials and the factors influencing their choice, the types of impression trays, as well as the decontamination practices of impressions used by private sector dentists in Casablanca, Morocco, in order to improve the outcomes of the fixed prostheses made.

2. Materials and Methods

A descriptive cross-sectional epidemiological study was conducted among private sector dentists in Casablanca, Morocco, over a period of about 5 months, from October 2022 to March 2023. A questionnaire was developed containing the following areas: impression materials and equipment used in fixed prosthodontics, criteria for their choice, impression tray and decontamination of impressions. The study was carried out using an anonymous individual questionnaire.

A pre-survey was conducted with 10 dentists in Casablanca to ensure the validity of the proposed questionnaire. The questionnaire was understandable to participants, and the response time to the questions was about 5 minutes, which led us to keep the initial questionnaire unchanged.

To obtain a list of private sector dentists in Casablanca, a request was submitted to the South Regional Council of Dentists who give us a list of 1752 dentists.

The initial sample consisted of 320 dentists out of a total of 1752.

For the distribution of the questionnaires, the survey team went to the dental offices of the dentists selected by random sampling.

Inclusion criteria in this study were:

Private sector dentists in Casablanca who practice fixed prosthodontics.

Exclusion criteria:

Dentists specialized in orthodontics

Pediatric dentists.

Data entry was performed using Microsoft Excel 2019. Statistical analysis of these data was carried out with SPSS software version 20.0 at the Community Health Laboratory: Epidemiology and Biostatistics of the Faculty of Dental Medicine in Casablanca. Variables were expressed in percentages and number of participants.

3. Results

Only 262 practitioners agreed to respond to the questionnaire presented to them, resulting in a participation rate of 81.9%. Impression materials and their selection criteria are presented in **Table 1** and **Table 2**. **Table 1** showed that the most used impression material was “condensation cured silicones” (68.7%). **Table 2** indicated that the most important selection criteria was accuracy with 98.1%. **Table 3** showed that the perforated impression tray was the most used impression tray (88.5%). **Table 4** showed the practice of decontaminating impressions among which running water ranks first (65.4%).

Table 1. Impression materials used.

Impression materials	(N)	(%)
Condensation cured silicones	180	68.7
Addition cured silicones	172	65.6
Irreversibles Hydrocolloïdes	86	32.8
Polysulfides	12	4.6
Others	9	3.4
Polyethers	8	3.1
Hydrocolloïdes réversibles	1	0.4

Table 2. Criteria for choosing impression materials.

Selection criteria	(N)	(%)
Accuracy	257	98.1
Dimensional stability	251	95.8
Market availability	224	85.5
Indication	220	84

Continued

Working time	211	80.5
Knowledge of material properties	205	78.2
Setting time	205	78.2
Habits and preferences	203	77.5
Cost	176	67.2
Brand	174	66.4
Biologic properties: toxicity, irritation	172	65.6
Patient Confort (Consistency, taste, odor...)	171	65.3
Wettability	162	61.8

Table 3. Types of impression trays used.

Type of impression tray	(N)	(%)
Perforated	232	88.5
Metallic	206	78.6
Plastic	149	56.9
Custom-made	69	26.3
Partial arch tray	63	24
Non perforated	34	13

Table 4. Decontamination of impressions.

Variable	(N)	(%)
Impression decontamination before sending to laboratory:		
Yes	239	91.2
No	23	8.8
Frequency of decontamination:		
Always	170	71.1
Often	53	22.2
Rarely	16	6.7
Decontamination products:		
Running water	155	65.4
Alcohol	83	35
Sodium hypochlorite	51	21.5
Chlorhexidine	37	15.6
Glutaraldehyde	30	12.7
Surface disinfectant	5	1.9

Continued

EDTA	2	0.8
Hydrogene peroxyde	2	0.8
Povidone iodine	0	0
Indication of decontamination to the dental technician:		
No	155	63
Yes	91	37

4. Discussion

The results of our survey showed that the most commonly used materials for impression-taking in fixed prosthodontics are condensation cured silicones at 68.7% and addition cured silicones at 65.6% (**Table 1**).

The results of studies conducted in Nepal, India, and Saudi Arabia align with ours. Addition cured silicones are the materials of choice, with respective percentages of 65.9%, 88%, and 76% [3]-[5].

According to the literature, elastomers, specifically silicones, have gained popularity as impression materials by addressing two major issues associated with hydrocolloids: poor dimensional stability and inadequate tear strength. Silicones are versatile, compatible with all impression techniques, have no adverse effects on living tissues, and can be combined with various replica materials. Type A silicones share the advantages of type C silicones without their drawbacks, being specifically modified to become the reference materials in fixed prosthodontics, although their relatively high cost may be a barrier to their use [6]. Conversely, the least used materials are reversible hydrocolloids (0.4%), polyethers (3.1%), and polysulfides (4.6%) (**Table 1**).

Similar results were obtained from a study conducted in Kenya. Indeed, a minority of Kenyan practitioners use polyethers and polysulfides, with a percentage of 1% for both materials. Regarding reversible hydrocolloids, their use is almost nil [7].

The lack of use of reversible hydrocolloids can be explained by the need for specific equipment for this type of material and the lack of advantage regarding their reversibility given the risk of cross-contamination [6].

No practitioner in our study reported the use of polyvinyl ether siloxanes (PVES). This may be due to unfamiliarity with this material given its recent commercialization. This new elastomer has the advantage of combining the dimensional accuracy of polyvinyl siloxane (addition cured silicones) with the hydrophilic nature of the polyether [8].

Regarding the criteria for choosing impression materials (**Table 2**), our results showed that the majority of the surveyed dentists place importance on all the mentioned criteria. However, particular attention is paid to the following three criteria: accuracy (98.1%), dimensional stability (95.8%), and market availability (85.5%). The habits and preferences related to the choice of an impression ma-

terial are an important criterion for 77.5% of the practitioners in Casablanca. According to a survey conducted among dentists in Abidjan, 95% of them consider the habit of use or ease of handling of material as the main criterion for choosing impression materials. Moreover, the availability of materials on the market is an important factor for 65% of the dentists [9]. This preference is consistent with the literature, where most authors affirm that when the mechanical, physical, and physicochemical properties are equivalent, the choice of material depends on the practitioner's familiarity with its handling [10]-[13].

In turn, the impression tray in fixed prosthodontics (**Table 3**) must meet specific criteria to allow for quality recording. It must be rigid, undeformable, encompass all the tissues whose recording is desired, and allow for effective retention of the material. These criteria are mainly found in perforated trays made of thick stainless alloy, making it the safest tray for partial fixed restorations [6].

In our study, the results revealed that 78.6% of the surveyed dentists use metal impression trays, while 56.9% use plastic trays. In a study conducted in Sudan, the results indicated that 23.53% of the population studied works exclusively with metal trays, while 12.5% only use rigid plastic trays. Both types of trays are used by 63.97% [4].

In our study, 26.3% of the participants prefer to use custom trays (**Table 2**).

A study conducted in Saudi Arabia [14] showed that 10% of practitioners use custom trays in their fixed prosthesis cases. Another study in Nepal [3] showed that 6.2% of dentists use custom-made trays (CMT) in the same cases. We can qualify our results as unexpected given that the use of CMT in fixed prosthesis, unlike removable prosthesis, is rarely necessary. Indeed, its use is limited to arches with particular morphologies (length, width, asymmetry, undercut...) [6].

The impression is an essential element of communication between the dentist and the prosthesis laboratory. When it is removed from the patient's mouth, it is covered in saliva and sometimes even blood. Given that the oral cavity is a naturally septic environment, it is evident that impressions are subject to contamination by numerous microorganisms. It is then essential to combat the risk of cross-contamination between the office, the laboratory, and anyone likely to come into direct or indirect contact with these impressions by following specific protocols in order not to damage them [15].

We confronted the results of our study with those obtained in a study conducted in Casablanca in 2023 evaluating the quality of communication between dental offices and prosthesis laboratories [16] among 94 dental laboratories. Only 17% of the laboratories confirmed receiving previously decontaminated impressions from dental offices. In 35.1% of the cases, the state of decontamination of the impressions is mentioned on the laboratory form, while in 64.9% of the cases this information was not specified [16].

In a study conducted in Saudi Arabia in 2014 on the evaluation of measures taken to control cross-contamination by impressions among laboratory technicians and prosthodontists, it was shown that 97.9% of prosthodontists regularly decontaminate impressions before sending them to the dental technician. This

survey also focused on the communication between dental offices and prosthesis laboratories on this subject. 56.2% of practitioners affirmed that they notify the technicians about the decontamination. Concurrently, 60.9% of dental technicians confirmed receiving a notification regarding this decontamination [17].

Through our questionnaire, we tried to highlight the frequency of decontamination of impressions as well as the products used for this purpose by the dentists of Casablanca. It was revealed in our results (**Table 4**) that 91.2% of the practitioners decontaminate their impression before sending it to the prosthesis laboratory, but this is done at different frequencies. 71.1% of those performing the decontamination do it “always,” 22.2% do it “often,” and 6.7% do it “rarely.” Regarding the decontamination products, running water (65.4%), alcohol (35%), sodium hypochlorite (21.5%), and glutaraldehyde (12.7%) are the most used decontamination products. EDTA and hydrogen peroxide are used only by a minority.

The results obtained in a similar survey conducted in Qassim, Saudi Arabia in 2019 are close to ours. 87.9% of the practitioners decontaminate their impressions, 72.4% among them do it “always,” 10.3% “often,” and 5.2% “rarely” [18].

In another similar study conducted in Kenya, the results reported that nearly 44.3% of respondents regularly decontaminate their impressions. Among them, 55.8% prefer the use of sodium hypochlorite, 14% opt for glutaraldehyde, while a minority use chlorhexidine or hydrogen peroxide as a decontamination product [7].

5. Conclusions

This study has allowed us to identify the different materials frequently used in fixed prosthodontics by private sector dentists in Casablanca as well as the criteria for choosing them. The criteria for choosing impression materials largely determine the quality of patient care to ensure the functional and aesthetic parameters of a fixed prosthesis.

To avoid any risk of cross-contamination, systematic decontamination must be done on the impression using a method and a product adapted to the impression material used.

In parallel with the constant improvement of impression materials, the development of optical impressions is becoming increasingly prominent in dental practice and allows us to overcome a number of the disadvantages of traditional impressions mentioned in our study.

Conflicts of Interest

The authors declare no conflicts of interest.

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