

Epidemiological Inquiry about the Use of Pulpotec® In the Private Sector of Agadir and Marrakech

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Abstract

Introduction: As part of a thesis of 2nd cycle of the Department of Conservative Dentistry-Endodontics, we have conducted a survey of dentists around the private sector in Agadir and Marrakech. Descriptive cross-sectional study was carried out to:

- Determine the percentage of dentists who use Pulpotec®.
- Determine how these dentists have got informed about this product.
- Know if the practitioners understand the principles of this therapy with its advantages and drawbacks.

Material and Methods: A questionnaire of 14 questions was sent to 101 practitioners' in Agadir and 100 in Marrakech, randomly selected from a list provided by the National Order Council of the Dentists (NOCD).

Results: The results showed that 48, 51% of these dentists in Agadir and 42% in Marrakech were using Pulpotec® in their dental practices. The majority of those dentists were informed of Pulpotec® through their colleagues and the product was provided by most of suppliers of dental equipment.

We also found that the three main reasons for its use according to the practitioners were its rapid and lasting analgesic action, the simplicity of its technique and the time saved.

The results of this study showed that users were aware of potential complications associated with the use of Pulpotec®.

Discussion: The results of this study showed that almost half of dentists, 48, 51% in Agadir and 42% in Marrakech were using pulpotec®. This product was used on temporal, permanent, mature and immature teeth. In addition, the perception of the majority of these private practitioners about the use of Pulpotec® in their daily treatments was generally not consistent with current science data.

Conclusion: The analysis of the results of our study showed that this product was widely used by dentists in the private sector.

Current studies proved the toxicity of formaldehyde and recommend the replacement of formaldehyde-based products with bioactive materials, like biodentine and MTA.

For all these reasons, it is necessary to encourage the confreres to regularly carry out ongoing training in order to update their knowledge and be aware of current scientific data.

Keywords: Pulpotec®; Formaldehyde; Toxicity, Allergy; Carcinogenic effect

Introduction

The development of new dental materials and drugs aims to facilitate the daily practice of the dentist.

Thus, Pulpotec® has been marketed as the miracle product that will overcome many failures of conventional endodontic treatments. The active ingredient of this drug is the formaldehyde, which acts mainly by the mummification of the root's pulp. The wide diffusion of this product is explained by its clinical success and its technical simplicity.

Unfortunately, this technique has a major disadvantage which is the infection. The mummified

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necrotic pulp is a favorable medium for the proliferation of germs.

Moreover, mummification can be followed by different failures: pain, pulpal necrosis, periapical pathologies, fistulas, pulpal calcifications and gingival irritations.

Material and Methods

We opted for cross-sectional epidemiological survey by random sampling.

This survey took place in private dental practices of Agadir and Marrakech.

Our target population is the practitioners who work in private sector in Agadir and Marrakech.

There are 202 dentists in the Wilaya of Agadir and the province of Inzegane Ait Meloul, and 227 in Marrakech (NOCD).

Nevertheless, we have excluded from our survey:

Locked or abandoned dental practices.

Specialists in orthodontics.

Specialists in periodontics.

Specialists in oral surgery.

In Agadir, the survey was conducted on a sample of 121 dentists out of a total of 202, whose elements were selected by random sampling from a list provided by the National Council of the Order of Dentists (NCOD), and, on a sample of 116 dentists out of 227 in Marrakech.

To collect the data, we have elaborated a questionnaire of three pages written in French.

It contains 14 questions divided to 4 sections:

Practitioner identification.

Knowledge circumstances of Pulpotec®.

Basic knowledge about Pulpotec®.

Advantages and disadvantages of Pulpotec®.

Only 101 in Agadir and 100 in Marrakech filled out the questionnaires.

The survey was conducted by a student of the Faculty of Medicine dentistry of Casablanca in thesis proceedings.

However, a pre survey was essential in order to test and validate the questionnaire with 10 dentists who present the same characteristics of the population chosen for the survey.

After obtaining the list from the national council order of dentists and once the sample was assembled, we visited dental offices to fill the questionnaires.

Our survey started on the 15/02/2016 and ended on 18/10/2016.

The epidemiological component of this work was carried out in the epidemiological laboratory, and, data processing was performed using SPSS 10.0 software.

Results

The first question concerned the origin of the practitioners' diplomas, 58.4% from Agadir and 50% from Marrakech have

Table 1: Origin of the diploma.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Faculty of Casablanca	59	58.4	50	50
Faculty of Rabat	10	9.9	12	12
Other countries	26	25.7	35	35
No answer	6	5.94	3	3
Total	101	100	100	100

Table 2: Percentage of practitioners who know Pulpotec® in the private sector.

City	Agadir		Marrakech	
	Headcount	Percentage	Head count	Percentage
Knowledge of Pulpotec®				
Yes	94	93.1	94	94
No	7	6.9	6	6
Total	101	100	100	100

Table 3: Circumstances of knowledge of Pulpotec®.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Circumstances of knowledge of Pulpotec®				
Colleagues	67	71.28	63	67.02
Medical delegates	11	11.7	20	20
Internet	23	24.47	15	15.96
University education	15	15.96	18	19.15
Other answers	7	7.45	2	2.13

Table 4: Percentage of practitioners using Pulpotec® in the private sector.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Using Pulpotec® in the private sector				
Yes	49	48.51	42	42
No	45	44.55	51	51
No answer	0	0	1	1
Practitioners ignoring the product	7	6.9	6	6
Total	101	100	100	100

graduated from Casablanca dental faculty, 9.9% from Agadir and 12% from Marrakech have graduated from Rabat dental faculty, 25.7% from Agadir and 35% from Marrakech studied abroad: (Russia, Ukraine, Tunisia, France, Senegal, Romania, Bulgaria, Belgium, Poland, Syria (Table 1).

According to the dentists' answers, it turned out that 93.1% in Agadir and 94% in Marrakech knew the Pulpotec® (Table 2). 71.28% from Agadir and 67.02% from Marrakech learned about Pulpotec® from their colleagues, 24.47% from Agadir and 15.96% in Marrakech via the Internet, 15.96% from Agadir and 19.15% in Marrakech, during university education, a small percentage through the medical representatives and some responded otherwise: pubmed- reading-provider- commercial represent ant - medical expo - congress (Table 3).

Among those who knew Pulpotec®, 48.51% in Agadir and 42% in Marrakech were using it in daily practice (Table 4).

83.7% of users of this product from Agadir and 71.4% from Marrakech replied that it was available from all suppliers of dental equipment (Table 5).

Table 5: Availability of Pulpotec® at suppliers dental equipment.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Availability of Pulpotec® from all suppliers of dental equipment	41	83.7	30	71.4
Available after an order in advance	7	14.3	10	23.8
Available only from a few suppliers	1	2	1	2.4
Available from all suppliers of dental equipment but after an order beforehand	0	0	1	2.4
Total	49	100	42	100

Table 6: Type of dentition on which practitioners use Pulpotec®.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Temporary teeth	35	69.05	29	71.4
Immature permanent teeth	5	7.14	3	10.2
Mature permanent teeth	10	20.4	9	21.43
All teeth	4	8.16	4	9.52

Table 7: Indications from practitioners for using Pulpotec®.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Irreversible pulpitis	27	55.1	33	78.6
Necrotic pulp	8	16.3	11	26.2
Abscess	7	14.3	5	11.9
Other answers	11	22.45	6	14.3

Table 8: Advantages of Pulpotec® motivating practitioners to use it.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Simple technique	28	57.14	22	52.4
Save time	21	42.86	21	50
Fast and lasting analgesic action	24	48.97	23	54.8
Cicatrizization of the pulp stump	9	18.37	9	21.43
Low cost	4	8.16	6	14.3
Needless reintervention	4	8.16	6	14.3
Pulpotec® treatment life is satisfactory	17	34.7	10	23.8
Other answers	14	28.6	9	21.43

About the denture type, more than half of practitioners 71.4% from Agadir and 69.05% from Marrakech used Pulpotec® on temporary teeth, some of the others used it on immature permanent teeth, some on mature permanent teeth, but others used Pulpotec® on all types of dentition (Table 6).

About the indications of Pulpotec® 55.1% from Agadir and 78.6% from Marrakech used it in the treatment of irreversible pulpitis. Some dentists used this product in the treatment of necrotic pulp teeth and some in the treatment of abscesses; others used Pulpotec® on teeth with difficult access or complex canal anatomy (Table 7).

The main reasons for using this product in the private sector were its rapid and lasting analgesic action, the simplicity of its technique and the saving of time (Table 8).

According to dentists who had been questioned if they had

Table 9: Presence of complications while using Pulpotec®.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Presence of complications while using Pulpotec®				
No	20	40.82	21	50
Yes	28	57.14	21	50
No answer	1	2.04	0	0
Total	49	100	42	100

Table 10: Complications encountered while using Pulpotec®.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Chewing pains	11	39.3	9	42.85
Pulpal necrosis	7	25	4	19.05
Periapical reactions	7	25	3	14.28
Pulp calcifications	6	21.42	6	28.6
Induced pain	5	17.86	8	38.1
Gingival irritations or necrosis	4	14.3	0	0
Desmodontitis	9	32.14	8	38.1
Fistulas	3	10.71	1	4.8
Cellulites	0	0	2	9.52
Other answers	2	7.14	1	4.8

Table 11: Perception of dentists about the disadvantages of Pulpotec®.

City	Agadir		Marrakech	
	Head count	Percentage	Head count	Percentage
Disadvantages of Pulpotec®				
Toxicity	43	45.74	54	57.45
Risk of canal reinfection	46	48.94	53	56.4
No disadvantage	7	7.45	8	8.51
Other answers	5	5.32	3	3.2

encountered any complications after using this product: 57.14% from Agadir and 50% from Marrakech admitted that they had complications during Pulpotec® treatments, such as, pulpal necrosis, periapical reactions, pulp calcifications, gingival irritations or necrosis, fistulas, cellulitis (Table 9 and 10).

A question about the disadvantages of pulpotec had been asked to users as well as non-users of Pulpotec®, 45.74% from Agadir and 57.45% from Marrakech claim that Pulpotec® is toxic, 48.94% from Agadir 56.4% from Marrakesh report that Pulpotec® presents a risk of canal reinfection, some practitioners claim that Pulpotec® has no drawbacks;

Some dentists mentioned other disadvantages, like: Carcinogenic, risk of anaphylactic shock, mucosal allergy and persistent smell in the mouth (Table 11).

Discussion

The sizes of our samples: 100 dentists representing 44.05% of the total number of dentists in Marrakech, and 101 dentists representing 50% of the total number of dentists in Agadir, for the year 2016 were considered statistically significant, to be able to extend the results to the whole target population.

The main objective of our study was to know if Pulpotec® is widely used. So, the survey revealed that almost half of private dentists, 48, 51% in Agadir and 42% in Marrakech used Pulpotec® in daily practice.

Whether in Agadir or Marrakech we found that the majority of dentists (83.7% in Agadir and 71.4% in Marrakech) agreed that Pulpotec® was available from all suppliers of dental equipment. This showed the ease of access to the product and that it was imported from abroad and sold like any other drug or material for dental use.

The majority of dentists in both cities used Pulpotec® on temporary teeth. Nevertheless, the use of this product has been noted in the treatment of mature and immature permanent teeth.

According to the website www.Pulpotec.com, the indication of Pulpotec® is not limited to temporary teeth only but it is also indicated for permanent teeth whether they are immature or mature [1]. However, the majority of articles claim that the use of Pulpotec® is limited to temporary or immature permanent teeth [2-4]. Nevertheless, the technique of non-vital pulpotomy with this product has never been used in the Department of Pedodontics of our Faculty of Dental Medicine in Casablanca. Furthermore, the technique of pulpotomy by Formocresol was adopted in the first years within this service, but it was later rejected.

The authors currently recommend the substitution of formaldehyde-based products with other products, including biodentine and MTA, in pediatric dentistry [5,6].

The majority of practitioners used Pulpotec® in the treatment of irreversible pulpitis (55.1% in Agadir and 78.6% in Marrakech).

According to the manufacturer, Pulpotec® is indicated for pulpotomy treatment of irreversible pulpitis in permanent molars, treatment of molars with calcified canals, treatment of irreversible pulpitis in immature final molars, allowing the complete root edification of the tooth, treatment of pulpitis in temporary molars, treatment by pulpotomy of infected temporary molars, even in the presence of abscesses [1].

Studies have shown that Pulpotec® is effective in the treatment of temporary teeth with pulpitis or necrosis. However, the number of studies carried out is too insufficient for this product to have a scientific decline that could encourage its use [7,8]. What is worrying is that some practitioners do not know the exact indications of Pulpotec®.

During the investigation, the question about the disadvantages of Pulpotec® was asked not only to the users of the product but also to those who do not use it. Whether in Agadir or Marrakech the most cited disadvantages are the toxicity of the product and the risk of root canal reinfection. Other practitioners have added other disadvantages: risk of anaphylactic shock, mucosal allergy, persistent smell in the mouth, and carcinogenic effect.

In fact, the manufacturers state that Pulpotec® contains formaldehyde, toxic by inhalation and ingestion, which can cause, on contact with the skin, irritations, burns or hypersensitivity [1].

In the same context, K. Arai and Coll showed in 2011 that daily inhalation of formaldehyde by the practitioner, the patient and the dental assistant can be harmful [9].

In 2002, Kunisada and Coll found reactions of urticaria and anaphylactic shock in patients treated with a root canal disinfectant containing formaldehyde [10].

In 2004, Dr. Boyle, Director of the International Agency for Research on Cancer (IARC), announced that formaldehyde is

carcinogenic to humans; the expert working group has determined that there is now sufficient evidence that formaldehyde causes nasopharyngeal cancer in human [11].

Conclusion

The purpose of our study was to gain insight into the habits of practitioners regarding the use of Pulpotec® in their dental practices, and to determine the benefits and complications they encountered during their Pulpotec® treatments.

The analysis of the results of our study showed that this product is widely used because of its rapid and lasting analgesic action, the simplicity of its technique and the saving of time. This has allowed some practitioners to use Pulpotec® in a systematic way instead of conventional endodontic treatment.

However, the insufficiency of the scientific evidence proving its effectiveness especially for permanent teeth, and the large number of complications encountered during its use, as well as the recent studies proving the toxicity of formaldehyde, must provoke a wide reflection among dentists who use it.

Thus, the latest studies recommend the replacement of formaldehyde-based products with bioactive materials, namely biodentine and MTA.

For all these reasons, it is necessary to encourage the confreres to regularly carry out ongoing training in order to update their knowledge and be aware of current scientific data.

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