ORIGINAL ARTICLE

THE PREVALENCE OF RUBBER DAM AMONG DENTISTS IN DIFFERENT COUNTRIES

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ABSTRACT

The aim: To assess the actual prevalence of rubber dam usage among general dentists.

Materials and methods: Surveyed participants were offered a questionnaire containing 14 questions about gender, country of origin, clinical experience, time and place of acquisition of skills of rubber dam, as well as the frequency of its usage.

Results: 30.69% of dentists always use rubber dams for direct restorations; 74.26% always use rubber dams during root canals treatment; 36.3% always use rubber dam for bonding indirect restorations.

Conclusions: The prevalence of rubber usage among general dentists shows positive growth dynamics, but the frequency is still considered insufficient.

KEY WORDS: rubber dams, dental general practice, endodontics, school dentistry, dental research

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INTRODUCTION

Undoubtedly, the rubber dam is an adjunct that has proven its effectiveness in dental practice, in particular in preventing the spread of cross-infections, swallowing instruments, as well as a tool that indirectly improves the quality and success rate of restorative and endodontic manipulations. Despite the fact that many researchers find it very useful [1-4] and recomendations of numerous associations to apply it in everyday clinical practice [5-7], the prevalence of its usage remains far from desirable, according to some sources [4,8–10]. Alarming statistics are observed among general dentists, who occupy the most massive pool among all dentists around the world.

THE AIM

The aim of the study was to assess the actual prevalence of rubber dam usage among general dentists. Also, identify the relationship between the prevalence of rubber dam and clinical experience, the place of practice of the interviewed dentists as well as to clarify the most challenging issues in rubber dam application procedure.

MATERIALS AND METHODS

In order to achieve the objectives of the study, a survey method based on a questionnaire was chosen. To attract an international audience, it was decided to offer a questionnaire through two popular dental communities on the social network (Facebook) with 29.0 and 86.4 thousand participants, respectively. The questionnaire contained 14 questions about gender, country of origin, clinical experience, time and place of acquisition of skills in the use of the rubber dam, as well as the frequency of its application and was created in Google Forms.

Only general practice dentists were filtered from the general pool of answers. The rest of the participators were not considered. Respondents who did not provide demographic and reference data were excluded from further research.

Microsoft Statistical Excel 2016 and IBM SPSS Statistics 22 were used for statistical processing of the obtained data. The chi-square criterion was calculated to find the relationship between the rubber dam usage and various factors, the significance threshold was set at $p = 0.05$ [11].

RESULTS

A total of 165 dentists of various specialties completed the questionnaire. The cohort of general dentists was 64.85% - 107 people. 94.39% of this group was then considered (6 out of 107 people were excluded according to the policies of the study). A total of 57 men (56.44%) and 44 women (43.56%) participated. The geography of the study was rather wide. The largest number of responses were received from Ukraine 52 (51.49%) and France 37 (36.63%). Some separate forms came from Russia - 5 (4.95%) and Egypt, Czech Republic, Slovakia, Italy, Germany, Belgium, Georgia - 1 (0.99%) from each country.

The majority of respondents were practicing in large cities of more than 1 million inhabitants (29 - 28.71%) while 28 - 27.72% in cities from 250 thousand - 1 million population. A small part (14-13.86%) has had clinical practice in medium-sized cities of 100-250 ths.inhab. and 50 - 100 ths. inhab. (1-0.99%). The rest

Table I. Period of rubber dam implementation into practice and career duration

Implementation period	Clinical experience (persons)				
	≤5 years	6-15years	16-25 years	26-35 years	≥36 years
From the beginning of the career	38	19	1	0	1
With a certain delay	11	15	8	4	1
Do not apply rubber dam	2	0	1	0	0
Total	51	34	10	4	2
Grand total	101				

Table II. The interrelation between the origin of the rubber dam application skill and the period of its implementation into practice

Implementation moment	Origin of skills acquisition (persons)			
	University / dental school	Master class	Independent	No data
From the beginning of the career	30	9	20	0
With a certain delay	5	7	27	0
Do not apply rubber dam	1	0	1	1
Total	36	16	48	1
Grand total	101			

Table III. Frequency of rubber dam usage for direct restorations

Implementation moment	Frequency of usage (persons)				
	Always	Regularly	Occasionally	Never	No data
From the beginning of the career	21	27	10	1	0
With a certain delay	10	16	10	2	1
Do not apply rubber dam	0	0	1	2	0
Total	31	43	21	5	1
Grand total	101				

Table IV. Frequency of rubber dam usage for endodontic treatment

Implementation moment	Frequency of usage (persons)				
	Always	Regularly	Occasionally	Never	No data
From the beginning of the career	47	8	3	0	1
With a certain delay	28	5	3	2	1
Do not apply rubber dam	0	0	1	2	0
Total	75	13	7	4	2
Grand total	101				

were practicing in small settlements of 10-50 ths. inhab. (13 - 12.87%) and less than 10 thousand population (14 - 13.86%) (Table I).

Also, the vast majority of respondents (88 - 87.13%) were employed or self-employed in private practice clinics, while only 2 - 1.98% worked in public / municipal hospitals and 4 - 3.96% in dental schools / medical universities, 6 - 5, 94% of respondents practiced in several different places (Table I). In terms of clinical experience, the majority (51 - 50.49%) were young dentists with less than 5 years of experience, the second largest (34 - 33.66%) was a group of 6 to 15 years of experience. The group from 16 to 25 years of experience was represented by 10 - 9.90% while 4 - 3.96% and 2 - 1.98% of participants were from groups from 26 to 35 years and over 36 years of clinical practice, respectively.

The majority of respondents 48 - 47.52% replied about having acquired the rubber dam application skills alone or with the help of thier colleagues, 36 - 35.64% received the necessary knowledge while studying at university or dental school, and 16 - 15.84% said that they attended special master classes independently. The respondents that started using the rubber dam from the beginning of their career are represented by the group of 59 - 58.42%, while others (39 - 38.61%) started using it with a delay. There were very few dentists who claimed not using rubber dam at all (3 - 2.97%). Among all participants, 74-73.27% of respondents were mostly satisfied with their manual skills of rubber dam usage and 16 - 15.84% were completely satisfied, while 8 - 7.92% were mostly dissatisfied, 1 - 0.99% were completely dissatisfied and 2 - 1.98% could give a distinct reply.

The frequency of rubber dam usage for direct teeth resto-

rations was as follows: 31 - 30.69% of doctors indicated its mandatory application, while 43 - 42.57% said claimed to use it in most cases, 21 - 20.79% indicated its irregular usage, 5 - 4.95% do not use rubber dam for direct restorations and 1 - 0.99% of respondents do not perform direct restorations at all.

As for the rubber dam application for endodontic treatment, the situation was much better, i.e. 75 - 74.26% stated its mandatory usage, 13 - 12.87% were using it in most cases, 7 - 6.93% indicated periodic usage and only 4 - 3.96% did not use it for root canal treatment, while 2 - 1.98% of general dentists do not perform endodontic treatment.

In contrast to the previous case, the prevalence of rubber dam usage was much worse for indirect restoration bonding: only 29-27.7% of respondents stated to apply it obligatory, 23-22.77% - in most cases, 18-17.72% - sometimes and 10 - 9.90% never use rubber dams for this procedure. In addition, 16 - 15.84% of respondents do not perform indirect restorations at all, and 5 - 4.95% failed to answer distinctly.

According to the questionnaire, only 17 - 16.83% of respondents do not have difficulties with the rubber dam application, while the majority (71 - 70.29%) report about facing various technical problems, e.g. poor clamp retentions, latex curtain tears, problems with rubber dam inversion, etc. Quite a significant part (32 - 31.68%) reports numerous difficulties, e.g. technical problems and reluctance of the patient, economic reasons and lack of time, etc. After a more profound clarification of the technical difficulties that general practitioners regularly face with, it was found that the most common and recurring difficulty is poor clamp retention (73 - 72.28%). Regular fluid leakage from under the rubber dam edges is reported by 49 - 48.51% of respondents. However, 61 - 60.39% of respondents regularly face more than one difficulty.

Statistical checkup revealed a significant difference between French and Ukrainian general dentists in the period of introduction of rubber dam into their clinical practice. Namely, 83.8% of French versus 40.4% of Ukrainian general dentists claimed to start using rubber dams from the very beginning of clinical practice $\chi2(18, N = 101) = 55.82, p = .012$. The difference is also noticeable when comparing the answers of Ukrainian and French doctors to the question of origin of rubber dam application skills, i.e. 3.8% of Ukrainians report acquiring these skills in medical school classes against 81.1% of French respondents; $\chi2$ (27, N = 101) = 71.33 $p < .05$. Another significant difference between Ukrainian and French general dentists was also found in the parameter of mandatory use of rubber dam for bonding of indirect restorations, which was 20.7% against 65.5%, respectively; $\chi2$ (45, N = 101) = 79.50, p = .001.

It is noteworthy that the majority (74.5%) of young doctors (less than 5 years of work experience) use rubber dam from the very beginning of their career compared to the general cohort (58.4%), $\chi2$ (8, N = 101) = 24, 19, p = .002 (Table I).

Another notable parameter is the relationship between the time of acquisition of skills and their implementation into clinical practice: 83.3% of general dentists who claimed to achieve the skill at the university, began its instant implementation, comparing to those who attended special courses (56, 3%), and to those who independently achived the skill (41.7%), $\chi2$ (6, N = 101) = 49.09, $p < .05$ (Table II).

Regarding satisfaction rate with manual skills, it should be noted that the rate of absolutely satisfaction with the rubber dam skills was the highest in the group of those who reported using a rubber dam from the beginning of their career (75%); $\chi2$ (8, N = 101) = 25.69, p = .001.

The percentage of practitioners who obligatory use rubber dam for direct restorations is 35.6% Most respondents have been using it since the beginning of their careers (67.7%) compared to those who acquired the skill with a delay (32, 3 %); $\chi2$ (8, N = 101) = 30.17, p = .034 (Table III).

The prevalence of mandatory rubber dam usage during endodontic treatment was 74.3%. Also, the percentage is significantly higher among those who has been using it since the beginning of clinical practice (62.7%) compared to those who has been applying it with a delay (37.3%); $\chi2$ (8, N = 101) = 38.64, p = .011 (Table IV).

Concerning the rubber dam usage for indirect restorations bonding only 36.3% of respondents apply it for this type of procedure. At the same time, 86.2% of this cohort have used it since the beginning of their careers, $\chi2$ (6, N = 80) = 34.43, $p < .05$.

DISCUSSION

The number of participants was lower than in the survey performed in the Czech Republic - 450 [12] or Saudi Arabia - 193 [19], but very close to those conducted in Turkey - 143 [18], India - 101 [17] and Nigeria - 100 [9] and even more than some others. This amount was sufficient for regular statistical analysis.

Although the survey covered 9 countries, we explain the origin of majority of participants from some particular countries, such as Ukraine and France, with the particular audience of social networking groups used for the questionnaire placement, although they were international and available for dentists from around the world. In addition, the predominance of participants with little clinical experience (less than 5 years) can also be explained by the location of the questionnaire, as young people are generally considered to be more active in social networks than more mature people.

It is observed that dentists who have acquired the rubber dam usage skills during undergraduate education use it more regularly, which is consistent with the results of Kapitán & Šustová, 2011 [12]. The level of satisfaction and prevalence of rubber dam use is also higher among early users [12,13].

However, there is a disparity in skills acquisition between different countries (e.g. Ukraine and France). Despite the fact that the difference is furtherly eliminated by gaining skills at additional training and master classes, the reasons of undertraining of Ukrainian dentists at the undergraduate stage is a field of interest.

Mandatory rubber dam usage is more common for endodontic treatment (74.3%) rather than for direct or indirect restorations (35.6% and 36.3%, respectively). The prevalence of its mandatory application in endodontic procedures, which we received in our study, was much higher than in many other recent studies, for example: Palmer et al., 2009 - 30.3% [14], Koch et al., 2009 - 67% [15], Hill & Rubel, 2008 - 58% [16], Kapitán & Šustová, 2011 - 26%, Jena et al., 2014 - 34.4% [17].

We also share the opinion of Kapitán & Šustová, 2011 [12] that the prevalence of rubber dam usage could theoretically be

lower if older dentists were more involved. It is also should be mentioned that in some countries the training for the rubber dam application has been included as the mandatory part of undergraduate dental training relatively recently. Also, the questionnaire was posted in Facebook communities which audience consists mainly of young practitioners and those who are more committed to their profession.

CONCLUSIONS

Thus, we can conclude that:

- The prevalence of rubber dam usage among general dentists shows positive growth dynamics, but the frequency is still considered insufficient.
- Mandatory rubber dam application is more common for root canal treatments than for direct or indirect restorations.
- Undergraduate studies show a more positive effect on the effectiveness of further implementation of the rubber dam in the daily practice of general dentists than the acquisition of such skills at a later stage.
- Study programs of medical universities and dental schools in some countries require the revision and introduction of additional training hours for mastering rubber dam application skills.

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The Authors declare no conflict of interest.

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