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Original article

STUDY OF THE KNOWLEDGE AND USE OF RESILIENT DENTURE LINING MATERIALS IN CLINICAL PRACTICE

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SUMMARY

Introduction: Since the beginning of the last century until today, resilient resins have been used for the lining of partial and complete dentures with the aim to achieve more uniform distribution of masticatory pressure and to reduce the trauma of mucous membranes.

The aim of this study was to investigate the knowledge and use of resilient denture lining materials (RDLMs) in clinical practice.

Material and methods: The study was conducted among dental practitioners and dental technicians in 2016. A direct survey method was used, with a questionnaire containing 11 questions.

Results: Over half (53.4%, n = 133) of the respondents do not use RDLMs in their practice. In the cases of retentive prosthetic field or prosthetic field with advanced atrophy, the respondents focus mainly on the surgical preparation of the prosthetic field and recommend the use of RDLMsif there are exostosis-related pain symptoms (≈ 41%, n = 103) or painful neurogenic points (≈ 44%, n = 105). One-third of the respondents prefer the use of long-term RDLMs, and 73% prefer to apply the indirect lining technique.

Conclusion: The various types of RDLMs and their characteristics are well-known by the dental practitioners and dental technicians but rarely used, due to a number of unresolved related issues, such as ungluing of the resilient material from the denture base, appearance of an unpleasant odor, change in the color or texture of the material, etc. In our study, dental practitioners and dental technicians use RDLMsfor complete denture lining mainly in clinical cases with presented pain symptoms.

Keywords: complete dentures, soft denture liners, resilient denture lining materials

INTRODUCTION

Clinical cases of excessive bone resorption presented thin, non-pliable mucosa or mobile mucosa in the area of the alveolar ridge crest, exostosis or painful neurogenic points in edentulous patients require specific methods of treatment. From the beginning of the last century until today, resilient resins have been used for the lining of partial and complete dentures with the aim to achieve a more uniform distribution of masticatory pressure and to reduce the trauma of mucous membranes. However, the use of these materials is not very popular among dental practitioners and dental technicians. Few of them are those who use complete denture lining in their practice. Resilient denture lining materials have many advantages and a number of disadvantages, which are described in detail in the scientific literature [1 – 11].

The aim of this study was to investigate the knowledge and use of resilient denture lining materials in the clinical practice of dental practitioners and dental technicians.

MATERIAL AND METHODS

The study was conducted between February and May 2016 among dental technicians and dental practitioners, including lecturers at the Faculty of Dental Medicine in Sofia, Plovdiv and Varna, respectively. The survey was voluntary and anonymous. Just over 400 questionnaires were distributed among the dental technicians and dental practitioners in the above cities, 258 of which were actually and accurately completed.

A direct survey method was used to obtain the necessary information. The questionnaire, made by us, contained 11 questions about the types of denture lining/rebasing materials, types of techniques, indications and contraindications for their use, etc. The respondents answered in writing the questions by indicating the preferred answers.

QUESTIONNAIRE

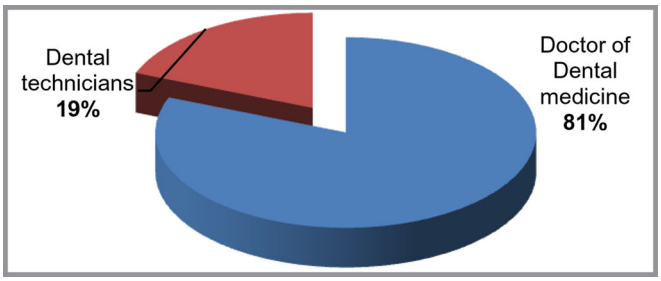
Question 1. You are:
1.a dental practitioner
2.a dental technician
Question 2. How many years of service do you have?
1.up to 10 years
2. up to 20 years
3. over 20 years
Question 3. What would you recommend to your edentulous patients, who wear hard-adhering or uncomfortable complete dentures due to advanced atrophy of the alveolar ridges, presence of painful neurogenic points, exostosis, or retentive alveolar ridges?
1.dentures made of polyamide materials (thermoplastic nylon) of the Valplast type
2.complete dentures lined/rebased with resilient denture lining materials(soft denture liners)
3. denture adhesives
4. pre-prosthetic surgical preparation
5. another type of specific complete dentures
Question 4. In what cases do you recommend resilient denture lining materials to your patients? (more than one answer)
1. severely retentive alveolar ridges
2. severely atrophied alveolar ridges
3. hard-adhering dentures due to reduced salivation
4. presence of exostosis
5. presence of painful neurogenic points
6. in the course of implant-prosthetic treatment
7. in relation to the wearing of an obturator or a maxillofacial prosthesis
8. other clinical cases…….
Question 5. What type of resilient denture lining/rebasing materials do you use most often in your practice?
1. short-term resilient denture lining materials(for 3-6 months)
2. long-term resilient denture lining materials(for more than 6 months)
3.none
Question 6. What type of technique do you prefer to use?
1.direct lining in the clinical consulting room
2. laboratory(indirect)lining in the dental laboratory
3. combined(direct-indirect)lining
Question 7. What type of disadvantages of soft denture liners have you observed?
1. change in the color of the material
2. change in the texture of the material (hardening of the material)
3. appearance of an unpleasant odor
4. ungluing of the resilient material from the denture base
5. accumulation of white coating on the inner denture surfaces
6. fluid imbibition
7.denture fracture
8. other …….
9. none
Question 8. After what period of time have you replaced the resilient material or made a new denture?
1. 1-2 months **2.** 4-6 months **3.** 1 year **4.** 2 years**5.** never
Question 9. Have you had patients who disapproved of soft denture lining/rebasing and preferred to wear conventional dentures (without a soft denture liner) despite the experienced discomfort?
1. yes **2.** no
Question 10. What type of instructions do you give to your patients for cleaning of the soft-lined dentures?
1. to wash the dentures with a soft toothbrush and soap
2. to soak the dentures in a denture cleaning solution for a short time and wash with a toothbrush and soap
3.not to use a toothbrush, just soak the dentures in a denture cleaning solution for 15-30 minutes
4.to soak the dentures in a denture cleaning solution for 24 hours
5.to soak the dentures in a denture cleaning solution for 15-30 minutes and clean with a soft toothbrush only the area of the hard resin and teeth
6.other……

TheSPSS statistical program (*SPSS Inc., IBM SPSS Statistics*), version 24.0 for Windows 10, Microsoft Office 2007, was used for the statistical processing of results. A 95% confidence level ($p<0.05$) was determined, and the χ^2 - *Pearson's chi-square criterion*- was used to determine the relationship between categorical variables.

RESULTS

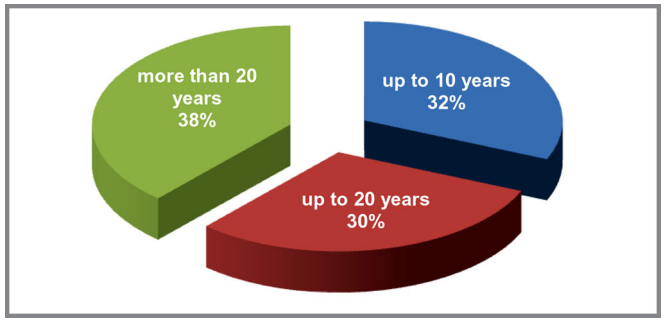
Two hundred and nine (209) doctor of dental medicine and 49 dental technicians with different lengths of service and specialties were interviewed, Fig. 1 ($p<0.01$).

Fig. 1. Distribution of respondents by occupation



The distribution of respondents by the length of service was relatively uniform, with no confidence differences between the groups ($p = 0.22$). 81 (31.4%) respondents had less than 10 years, and 78 (30.2%) respondents had between 10 and 20 years of work experience.

Fig. 2. Distribution of respondents by the length of service



It is clear that the largest is the group of respondents,38.4% (n = 99), with more than 20 years of experience; Fig. 2 ($\chi^2 = 3.000$, $p = 0.2231$).

The next two questions (3 and 4) focused on obtaining information about the clinical decisions taken in cases of retentive prosthetic field, a prosthetic field with advanced atrophy, etc., as well as in what clinical cases the use of RDLMs would be recommended. The answers to question 3 indicate, on the first place, the respondents' preference for surgical preparation of the prosthetic field (49.8%, n = 125) and after then, for denture lining with RDLMs (36.3%, n = 91) and the use of adhesives (34.7%, n = 87) (Table 1($\chi^2 = 143.840$, $p<0.0001$)).

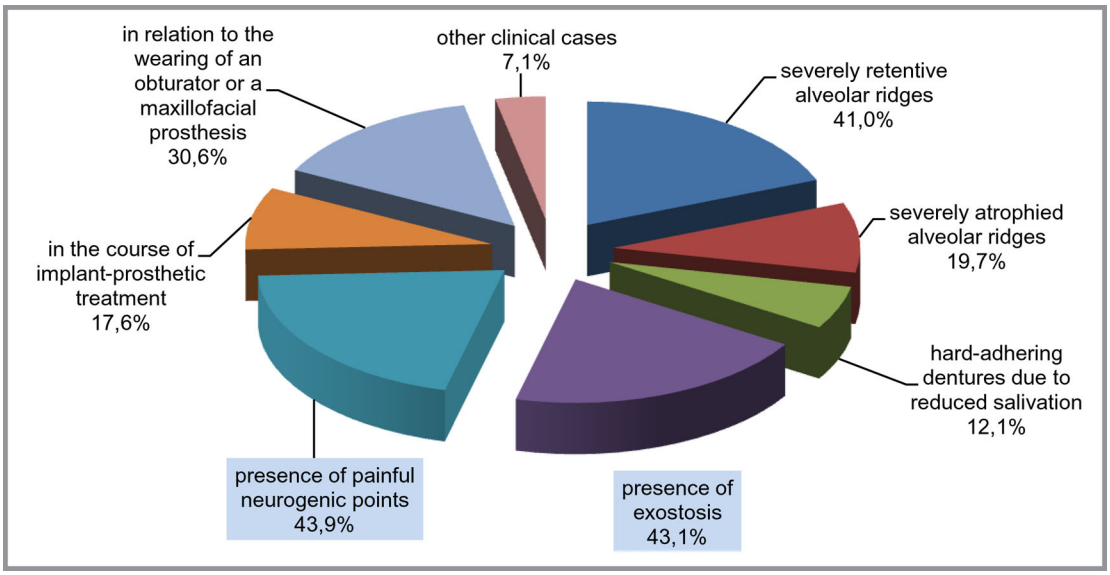
Table 1. Distribution of respondents' answers to question 3

number of respondents' answers to question 3	answers		% of respondents
	number	%	
dentures made of polyamide materials (thermoplastic nylon) of the Valplast type	59	14.8%	23.5%
complete dentures lined/rebased with resilient denture lining materials (soft denture liners)	91	22.8%	36.3%
denture adhesives	87	21.8%	34.7%
pre-prosthetic surgical preparation	125	31.3%	49.8%
other type of specific complete dentures	36	9.0%	14.3%
other	2	0.5%	0.8%
Total	400	100.0%	159.4%

Note: The percentage of all answers is greater than 100% because almost all respondents gave more than one answer

The number of respondents to question 4 "*In what cases do you recommend resilient denture lining materials to your patients?*" was 239 (92.6%) (Fig. 3); 19 people (7.4%) did not answer this question.

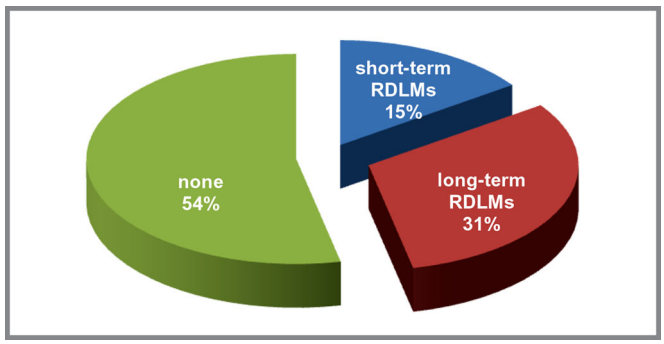
Fig. 3. Distribution of the cases with the recommended use of resilient denture lining materials



In most of the cases, lining with RDLMswas recommended "*in the presence of exostosis*" (43.1%, n = 103) and "*painful neurogenic points*" (43.9%, n = 105), on the second place, "*in severely retentive alveolar ridges*" (41.0%, n = 98) and on the third place, "*in relation to the wearing of an obturator or a maxillofacial prosthesis*" (30.6%, n = 73), ($p<0.05$).

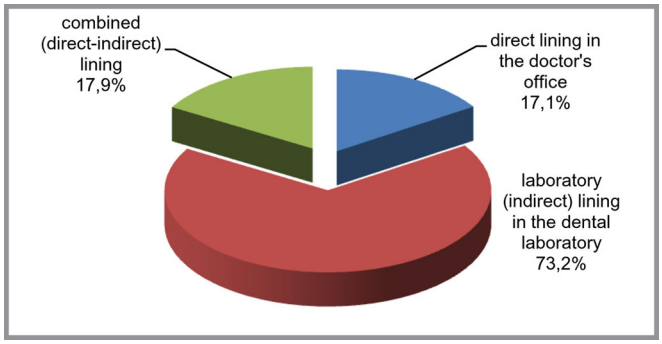
Question 5 aimed at obtaining information on the use of RDLMs. It is clear from the answers that over half of the respondents (53.4%, n = 133) do not use RDLMs (Fig. 4). One hundred sixteen respondents (46.6%) stated that they use RDLMs to support plate dentures. Of these, 78 (31.3%) prefer to use long-term RDLMs, while 38 (15.3%) –short-term RDLMs ($p<0.05$).

Fig. 4. Use of resilient denture lining materials



Question 6 "*What type of technique do you prefer to use*?" was again answered by less than half of the respondents (47.7%, n = 123). Some of them gave more than one answer. Laboratory (indirect) lining technique in the dental laboratory was preferred by 73.2% (n = 90) of the respondents, Fig. 5 ($p<0.0001$).

Fig. 5. Preferences for the type of lining technique



Question 7 "*What type of disadvantages of soft denture liners have you observed*?" was answered by 129 (50.0%) of the respondents. The largest was the proportion of respondents, who had observed an "*appearance of an unpleasant odor*" (59.7%, n = 77) and a "*change in the color of the material*" (55.8%, n = 72) (Table. 2, (χ^2 = 119.837, $p<0.0001$)).

Table 2. Soft denture liner disadvantages observed

Disadvantages observed	answers		% of respondents
	number	%	
change in the color of the material	72	19.7%	55.8%
change in the texture (hardening of the material)	47	12.9%	36.4%
appearance of an unpleasant odor	77	21.1%	59.7%
ungluing of the resilient material from the denture base	54	14.8%	41.8%
accumulation of white coating on the inner denture surfaces	47	12.9%	36.4%
fluid imbibition	49	13.4%	37.9%
denture fracture	4	1.1%	3.1%
other	1	0.3%	0.8%
none observed	14	3.8%	10.8%
Total	365	100.0%	281.0%

Note: The percentage of all answers is greater than 100% because almost all respondents gave more than one answer.

Question 8 "*After what period of time have you replaced the resilient material or made a new denture*?" was answered by less than half of the respondents (47.3%, n = 122). The majority indicated that they had to replace the RDLM or make a new denture after one year (32.8%, n = 40). "*Never*" was the second most frequently indicated answer (26.2%, n = 32). There was no significant difference (p = 0.43) between the two most preferred answers (Table3, (χ^2 = 22.804, p = 0.0001)).

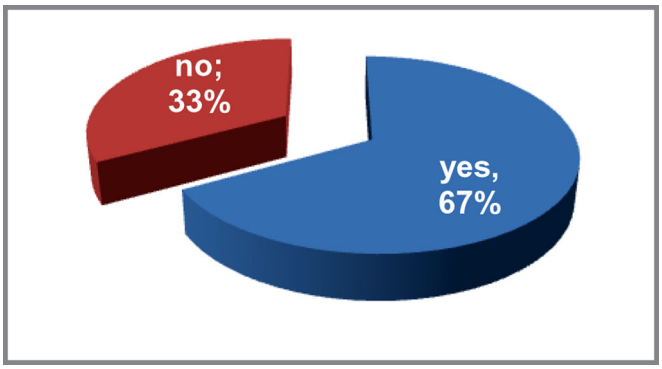
Table3. Distribution of respondents' answers to question 8

number of respondents' / answers to question 8	answers		% of respondents
	number	%	
1-2 months	5	4.0%	4.1%
4-6 months	26	20.8%	21.3%
1 year	40	32.0%	**32.8%**
2 years	22	17.6%	18.0%
never	32	25.6%	**26.2%**
Total	**125**	100.0%	102.5%

Note: The percentage of all answers is greater than 100% because almost all respondents gave more than one answer.

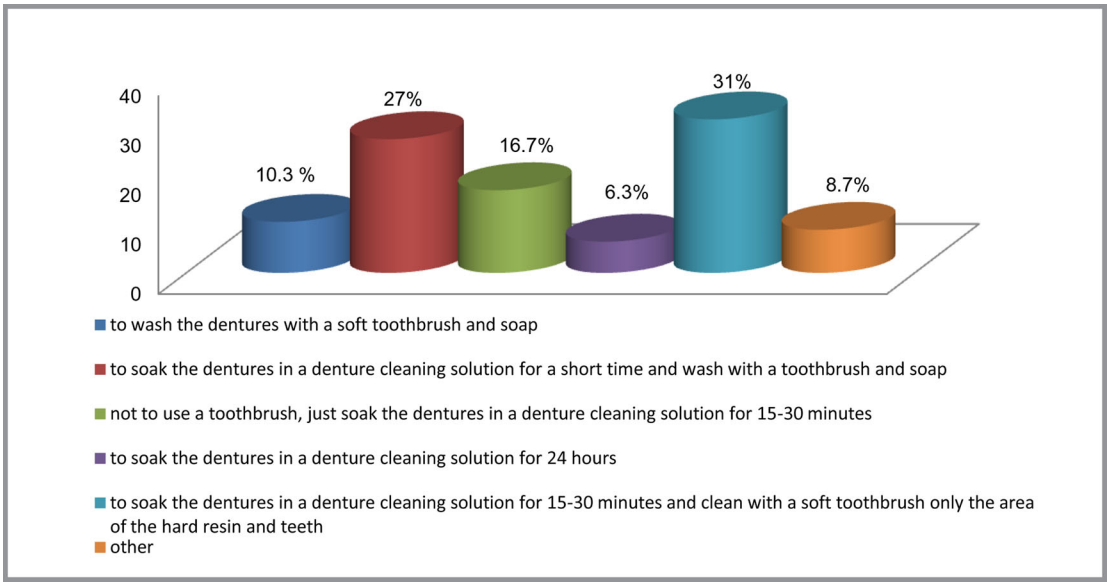
Question 9 "*Have you had patients who disapproved of soft denture lining/rebasing and preferred to wear conventional dentures (without a soft denture liner) despite the experienced discomfort?*" was answered by 119 respondents (46.1%). Two-thirds (67.2%, n = 80) of the respondents had no patients who disapproved denture lining with RDLMs, and one-third (32.8%, n = 39), with a significant difference (χ2 = 10.890, p = 0.001), had such patients (Fig. 6, p<0.001).

Fig. 6. Disapproval of denture lining with RDLMs



Question 10 informed us about the instructions that dental practitioners give to their patients for the proper care and maintenance of soft-lined dentures. This question was again answered by less than half of the respondents (48.8%, n = 126). The highest percentage of respondents recommend "*to soak the dentures in a denture cleaning solution for 15-30 minutes and clean with a soft toothbrush only the area of the hard resin and teeth*" (31.0%, n = 39) (Fig. 7, p>0.05). Answer 2 "*to soak the dentures in a denture cleaning solution for a short time and wash with a toothbrush and soap*" was in the second place (27.0%, n = 34), with a very little, statistically insignificant difference (p = 0.69).

Fig. 7. Recommendations for cleaning soft-lined dentures



Answer 3 "*not to use a toothbrush, just soak the dentures in a denture cleaning solution for 15-30 minutes*" was in the third place (16.7%, n = 21), also insignificantly different from answer 5 (p = 0.09). The next answers were significantly different from answer 5 (p = 0.001): Answer 1 "*to wash the dentures with a soft toothbrush and soap*" was recommended by 10.3% (n = 13) and "*to soak the dentures in a denture cleaning solution for 24 hours*" by 6.3% (n = 8). Answer 6 "*other*" was marked by 8.7% (n = 11) of the respondents. Some reported "*giving individual instructions to each patient*" or "*washing the dentures with water only*". Some of the respondents answered that they were not competent and recommended the "*usual care*".

DISCUSSION

Through the questionnaire, prepared by us, we examined the knowledge and use of RDLMs for plate dentures in the two main groups of dental product users (dental practitioners (n = 209) and dental technicians (n = 49)). From the answers to question 5, we found that more than half (53.4%, n = 133) of the respondents do not use RDLMs in their dental practice. In 2014, a similar survey was done by Il. Hristov [12] among 115 dental practitioners and 108 dental technicians, where the relative shares of RDLMs users and non-users were almost equal.

The answers to questions 3, 4, 6, 7, 9 and 10in our questionnaire also aroused interest.

A number of authors believe that advanced atrophy of the alveolar ridges, the presence of painful neurogenic points or a retentive prosthetic field are indications for denture lining with RDLMs (1 – 6, 13). Questions 3 and 4 aimed to examine the opinions of dental practitioners and dental technicians on what they would recommend to their patients in these clinical cases. The answers to question 3 formed two groups of respondents, the one including those with less work experience and the other, those with more work experience. Dental practitioners with less work experience (up to 10 and between 10 and 20 years) reported, in the first place, their preference for pre-prosthetic surgical preparation (≈ 60%), on the second, for the lining with RDLMs (≈ 30%) and, with a slight difference in percentage, for the use of denture adhesives. Dental practitioners with more experience (more than 20 years) indicated mainly denture lining with RDLMs(≈ 42%) and the use of denture adhesives (≈ 42%), while only one-third of them (≈ 34%) recommended pre-prosthetic surgical preparation. The opinions of the more experi-

enced respondents are explicable in view of the fact that pre-prosthetic surgical preparation is a risk-bearing procedure, especially in elderly patients. Dental technicians' responses in relation to laboratory techniques were also expected. They pointed out, in the first place, denture lining with RDLMs - a technology requiring no special technique, and in the second place, dentures of the Valplast type.

When asked otherwise (question 4) "*In what cases would you recommend lining with RDLMs?*", the majority of the respondents refer to pain symptoms as the leading symptomatology and recommend denture lining with RDLMs in exostoses (≈ 41%, n = 103), painful neurogenic points (≈ 44%, n = 105) and retentive tuberosities (H" 41%, n = 98). These results are in line with the recommendations in a number of publications [1, 2, 5]. A large group of authors [1 - 4, 6, 7, 13] recommend complete denture lining with RDLMs in advanced atrophy of the alveolar ridge, especially in the mandible, since the surgical enlargement of the prosthetic field, recommended by respondents with less work experience, is a difficult, not always successful and applicable procedure, especially in the elderly. The results of our survey show a low relative proportion of respondents (19.7%, n = 47), who prefer to improve complete denture functionality by lining with RDLMs in severely atrophied alveolar ridges. In both survey groups, this answer was placed in the fifth place.

The answers to question 6 "*What type of technique do you prefer to use?*" show a high relative proportion (72.2% (n = 90)) of users of RDLMs, who prefer the indirect lining technique. This result is in agreement with the data obtained by Hristov [12] in his survey [over 90%].

The answers to question 7 "*What type of disadvantages of soft denture liners have you observed*?" mention in the first place the "*appearance of an unpleasant odor*" (59.7%, n = 77) and in the second place, the "*change in the color of the material*" (55.8%, n = 72). The obtained results are inconsistent with the data, published by Hristov [12]. The disadvantage "*appearance of an unpleasant odor*", most commonly observed by us, was reported by only 13% in his survey, and the disadvantage "*denture fracture"* was placed third by his respondents in terms of frequency (2%, n = 22), while in our study, it was marked by only 3% (n = 4). The relative share of the respondents who have observed a "*change in the color of the material*" (39.8%) in the survey made in 2014 [12] is close to the result obtained by us. The difference in the data obtained in the two surveys may be due to different materials or different methodologies used by the respondents.

A number of authors have reported that denture lining with RDLMs is approved by the patients and increases their quality of life [7, 14]. The answers to question 9 "*Have you had patients who disapproved soft denture lining/rebasing and preferred to wear conventional dentures (without a soft denture liner) despite the experienced discomfort*" confirm this fact. Two-thirds of the respondents (67.2%, n = 80) said they did not have patients who disapprove of denture lining with RDLMs. The approval, registered by us, is in agreement with the data obtained by Il. Hristov [12], but it should be noted that the reason for this might be the lack of control visits. Our results also correspond to those obtained by Yordanov et al. [14] in a survey conducted in 2014 among patients with soft-lined complete and partial dentures after two years of use. The results of the above-mentioned study show the approval of denture lining by two-thirds of the surveyed patients.

A major problem with the dentures lined with RDLMs is their cleaning (question 10). In our survey, the highest percentage (58.0%, n = 73) of the respondents indicate that they recommend to their patients with soft-lined dentures to use a soft toothbrush first and then soak the dentures in a cleaning solution. These recommendations are confirmed by the data found in the literature [5, 8, 9]. The recommendation to the patients not to use a toothbrush when cleaning their soft-lined dentures is quite frequently given by the dental practitioners. These are dental practitioners that do not have a speciality but work mainly in the field of Prosthetic Dental Medicine. This is also in agreement with the data found in the literature [1, 10, 11]. Dental practitioners who do not recommend using a toothbrush to clean this type of dentures have reported accumulation of white coating on the inner surfaces. Whether to use a toothbrush to clean soft-lined dentures and on which surface to use it is a question that also turns out to be controversial. A number of authors recommend the use of a toothbrush and then soaking in a denture cleaning solution (5, 8, 9), while others have reported that mechanical brushing leads to increased roughness [1, 11], more pronounced for acrylic based materials [10]. Devlin [2] recommends that such dentures should be cleaned with water and soap only since peroxide-containing denture cleaning solutions lead to the damage of resilient materials. In our survey, one respondent indicated such an answer.

CONCLUSIONS

1. The various types of RDLMs and their characteristics are well-known by dental practitioners and dental technicians but rarely used, due to a number of unresolved related issues, such as ungluing of the resilient material from the denture base, appearance of an unpleasant odor, change in the color or texture of the material, etc.

2. Dental practitioners and dental technicians surveyed by us use resilient denture lining materials for complete denture lining mainly in clinical cases with pain symptoms - presented exostosis, retentive prosthetic field or painful neurogenic points, many of them considering the option of pre-prosthetic surgical preparation.

3. The use of double-layer complete dentures in cases of impaired stability and function due to severe atrophy of the prosthetic field is rarely practiced in our country. In these cases, dental practitioners and dental technicians recommend the use of denture adhesives primarily.

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