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ABSTRACT

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THE KNOWLEDGE AND ATTITUDE REGARDING VITAL PULP THERAPY AMONG DENTAL STUDENTS OF A UKRAINIAN UNIVERSITY

Introduction. Given the high incidence of complicated caries of permanent teeth in children in Ukraine, choice of an appropriate kind of vital pulp therapy (VPT) to save the tooth is very crucial. To optimize the use of VTP in dental practice and adapt university training to it, there is a need to document students' knowledge and attitudes towards dental pulp treatment.

Aim: To access the general level of knowledge and attitude towards the VTP of immature permanent teeth among dental students of Poltava State Medical University in Poltava, Ukraine.

Materials and methods. 164 fifth-year dental students were asked to complete an online survey using Google Forms. The survey included personal information about gender and age, as well as 17 questions regarding indications, stages of VTP, and materials used. Statistical analysis of the results was performed using Excel, using descriptive statistics and the $\chi 2$ test. The critical significance level for testing statistical hypotheses in this study was set at 0.05.

Results. Responses were obtained from 112 out of 164 students (response rate = 68.29%). The majority of students who participated in the study were 21–23 years old (92.07%) and predominantly females (57.1%). 83.9% of the students said that root apex closes 2–3 years after eruption and electric and thermal pulp tests are unreliable after traumatic injuries of permanent immature teeth. 69.6% of the participants agreed that VPT should only be performed in teeth with reversible state of pulp and successful outcomes of VPT decrease with the patient's age. 70.5% of the students agreed that the main objective of VPT is to initiate the formation of calcific bridge and indirect pulp capping is performed in a tooth with a deep carious lesion approximating the pulp but without symptoms of pulp degeneration. 79.5% of the respondents knew the definition of

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apexogenesis, and 77.7% – of apexification. 65.2% of the participants said that apexogenesis maintains pulp vitality due to dentin deposition and 50.9% answered that apexogenesis provides generating dentine bridge at the site of pulpotomy. 70.5% of the students mentioned a weak marginal adaptation to dentin and dissolution over time of calcium hydroxide ($Ca(OH)_2$ and agreed with complete pulpotomy in case pulp bleeding cannot be controlled after 10 min of direct exposure to sodium hypochlorite (NaOCl). 76.8% of the participants were aware that mineral trioxide aggregate (MTA) promotes better environment for pulpal repair and bridge formation as compared with $Ca(OH)_2$. Only 41.1% of the respondents were aware of the diagnostic importance of the sodium hypochlorite in deciding treatment options of partial or complete pulpotomy. 64.3% of the students said that caries marker dyes can be considered a valuable tool to minimize the pulp exposure, and 51.8% of participants agreed that if MTA is substituted for calcium hydroxide in VPT, similar time periods for apical maturation can be anticipated.

Females outperformed males in definition of apexification (70.13% vs. 48.53%, $p<0.05$) and understanding the superiority of MTA over $Ca(OH)_2$ in VPT (70.13% vs. 39.47%, $p<0.05$).

Conclusions. The dental students participating in this study showed mostly good knowledge and attitude toward VPT of young permanent teeth. Major knowledge gaps were identified regarding apexogenesis, which ensures the formation of a dentin bridge at the pulpotomy site, the same time of apex formation during VTP in both MTA and calcium hydroxide, and the use of sodium hypochlorite as a diagnostic tool for differential diagnosis of reversible and irreversible pulp changes.

In general, there is a need to improve knowledge and attitude of dental students about the VPT by their familiarization with new clinical guidelines.

Keywords: attitude, dental students, knowledge, permanent dentition, dental pulp, dental care for children.

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ЗНАННЯ ТА СТАВЛЕННЯ ДО ВІТАЛЬНОЇ ТЕРАПІЇ ПУЛЬПИ СЕРЕД СТУДЕНТІВ-СТОМАТОЛОГІВ УКРАЇНСЬКОГО УНІВЕРСИТЕТУ

Вступ. Зважаючи на високий рівень ускладненого карієсу постійних зубів у дітей в Україні, вибір відповідного методу вітальної терапії пульпи (ВТП) для збереження зуба є дуже важливим. Для оптимізації використання ВТП у стоматологічній практиці та адаптації університетської підготовки до неї існує потреба у документуванні знань та ставлення студентів до лікування пульпи зубів.

Мета. З'ясувати загальний рівень знань та ставлення до ВТП незрілих постійних зубів серед студентів-стоматологів Полтавського державного медичного університету (м. Полтава, Україна).

Матеріали і методи. Результати. На анкетування відповіли 112 студентів (доля відповідей 68.29%). Більшість студентів були віком 21–23 роки (92.07%) і переважно жіночої статі (57.1%). 83.9% студентів зазначили, що верхівка кореня закривається через 2–3 роки

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після прорізування, а електричні та температурні тести збудливості пульпи є недостовірними для діагностики травматичних пошкоджень постійних незрілих зубів. 69.6% учасників погодилися з тим, що ВТП слід проводити тільки в зубах із необоротними змінами пульпи, а успішні результати ВТП зменшуються з віком пацієнта. 70.5% студентів погодилися з тим, що основним завданням ВТП є ініціювання формування замісного дентину, а непряме покриття пульпи проводиться в зубі з глибоким каріозним ураженням, що розташоване близько до пульпи, але без ознак її дегенерації. 79.5% респондентів дали правильне визначення апексогенезу, а 77.7% – апексифікації. 65.2% студентів відзначили, що апексогенез підтримує життєздатність пульпи за рахунок відкладення замісного дентину, а 50.9% – що апексогенез забезпечує формування дентинного містка в ділянці пульпотомії. 70.5% студентів відзначили слабку крайову адаптацію до дентину та розчинення з часом гідроксиду кальцію і погодилися з проведенням повної пульпотомії якщо кровотечу з пульпи не вдається зупинити після 10 хв безпосереднього впливу гіпохлориту натрію. 76.8% опитаних знали, що мінерал триоксид агрегат (МТА) краще сприяє відновленню пульпи та формуванню дентинного містка порівняно з гідроокисом кальцію. Лише 41.1% знали про діагностичну важливість гіпохлориту натрію під час вибору часткової або повної пульпотомії. 64.3% студентів зазначили, що карієс маркери можна вважати цінним інструментом для мінімізації розкриття пульпи, а 51.9% з них погодилися з тим, що при заміні гідроокису кальцію на МТА під час ВТП можна очікувати аналогічні терміни дозрівання верхівки зуба.

Жінки краще визначили суть апексифікації (70.13%) та погоджувались із перевагами МТА в лікуванні пульпи (70.89%) в порівнянні з гідроокисом кальцію, ніж чоловіки (48.53% та 39.47% відповідно) ($p<0.05$).

Висновки. Студенти-стоматологи, які брали участь у дослідженні, продемонстрували здебільшого добрі знання та ставлення до ВТП незрілих постійних зубів. Основні недоліки знань були виявлені щодо апексогенезу, який забезпечує формування дентинного містка у місці пульпотомії, однакового часу формування верхівки під час проведення ВТП як у МТА, так і у гідроокису кальцію, а також щодо використання гіпохлориту натрію як діагностичного інструменту для диференційної діагностики оборотних та необоротних змін пульпи.

В цілому, існує потреба у покращенні знань та ставлення студентів-стоматологів до ВТП шляхом ознайомлення їх із новими клінічними настановами.

Ключові слова: відношення, студенти-стоматологи, знання, постійні зуби, пульпа, лікування зубів у дітей.

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ABBREVIATIONS
VPT – vital pulp therapy
$Ca(OH)_2$ – calcium hydroxide
MTA – mineral trioxide aggregate
NaOCl – sodium hypochlorite

INTRODUCTION

In Ukraine, dental caries is highly prevalent in permanent teeth and reaches 95% among children over 12 years, and decay-missing-filling index ranges from 1.73 to 6.4 among adolescents 12–18 years. The prevalence of permanent teeth with pulpal involvement was reported to be 37.1% to 18 years [1]. In view of a high level of complicated caries, choice of an appropriate kind of vital pulp therapy to save teeth is very crucial.

The contemporary approach to caries and its complications management has stimulated renovation of Ukrainian clinical guidelines for pulpitis in immature permanent teeth which will be issued next year. Control of students` knowledge which used in the course of their professional activities is performed in the classes [2], where fourth year dental students studied pulp diseases until the current academic year. In view of optimizing the dissemination of VPT in dental aid and of tailoring university training on it, there is a need to document these students` knowledge and attitude with respect to the pulp management.

The previous study has reported an inadequate dissemination of minimal intervention concept towards deep caries lesions management among French dental students [3]. Also Saudi dental practitioners [4] and Indian students [5] showed fair-to-good knowledge and attitude toward VPT of young permanent teeth.

The aim of this study is to access the overall levels of knowledge and attitude of vital pulp therapy of immature permanent teeth among dental students of Poltava state medical university (PSMU) in Poltava, Ukraine.

MATERIALS AND METHODS

The protocol of this cross-sectional questionnaire-based study, conducted between September 9 and November 29, 2024, was approved by the PSMU for Ethical Issues and Biomedical Ethics Commission (approval number 232). 164 dental students of the five year of study undergoing training in the university were invited to participate in the anonymous survey. The participants were invited to complete the questionnaire of Doumani et al. [4] consisting of 17 questions regarding steps in pulp therapy, materials used, indications etc. One original item about reversible pulpitis was modified for better understanding by the students. Also the questionnaire comprised personal information about gender and age, and the Google form link to it was sent to the group chats in Viber app (Rakuten Inc.). The responses for items were recorded as yes, no, and I don't know except the first answer which was recorded as yes and no. In order to prevent bias and avoid repeated inclusion of participants in the study, one of the authors (YNV) had access to the data.

Statistical analysis of the results was performed using Excel with descriptive statistics. Cronbach's alpha, the internal consistency test for reliability analysis, was used. In the case of independent groups (gender and age), the ratio was compared using the chi-square test. The results were analyzed with a significance level of $p < 0.05$.

RESULTS

Responses were obtained from 112 from 164 students (response rate = 68.29%). The majority of students who participated in the study were 21–23 years old (92.07%), while the oldest age was 28 years (1.78%). The study sample was predominantly females (57.1%). The internal consistency of the questionnaire was determined with Cronbach's alpha of 0.84, which was considered good.

When enquired among the study participants about the complete closure of the root apex, 83.9% of the study subjects mentioned 2–3 years [Figure 1].

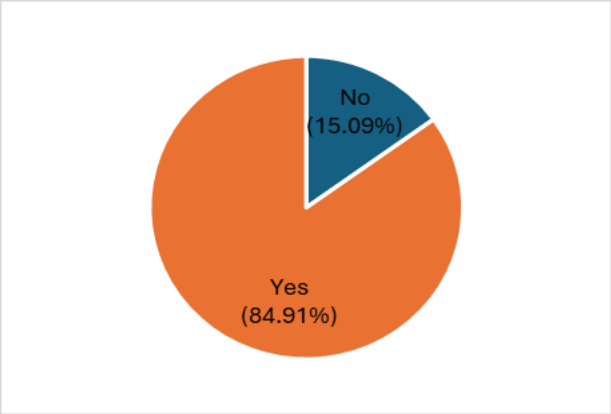

Fig.1 – The closure of root apex is completed approximately 2–3 years after eruption

To evaluate the knowledge of the indications and diagnosis of VPT, the study participants were asked about three items [Table 1]. 83.9% of the students correctly answered question about unreliable electric and thermal pulp tests after traumatic injuries of permanent immature teeth. 69.6% of the participants agreed that VPT should only be performed in teeth with reversible state of pulp. 70.5% of the students agreed that the main objective in VPT is to initiate the formation of tertiary reparative dentin or calcific bridge.

Six items assessed the different kinds of VPT for immature permanent teeth [Table 2]. 79.5% of the students mentioned that apexogenesis is a VPT procedure to encourage the physiological development and formation of the root apex. Moreover, 65.2% of the participants said that apexogenesis maintains pulp vitality due to dentin deposition. 50.9% of the students mentioned that apexogenesis provides generating

dentine bridge at the site of pulpotomy. The most of the participants (77.7%) viewed that apexification is a method to induce a calcified barrier in the immature apex. Moreover, the rate of the females who answered correctly (70.13%) to last item was significantly higher than the rate of the males (48.53%, p=0.02). 70.5% of the participants agreed that indirect pulp capping is performed in a tooth with a deep carious lesion approximating the pulp but without symptoms of pulp degeneration. 56.3% of the students mentioned that after indirect pulp capping, the patient returns in 8–12 weeks for placement of a permanent restoration.

Table 1 – The indications and diagnosis of VPT

Indication and diagnosis	**Yes**	**No**	**I do not know**
After traumatic injuries electric and thermal pulp tests may be unreliable	83.9%	9.85%	6.25%
VPT included pulp cupping and pulpotomy (vital amputation) should only be performed in teeth with normal pulp or reversible changes of pulp	69.6%	26.8%	3.6%
The main objective in VPT is to initiate the formation of tertiary reparative dentin or calcific bridge	70.5%	25%	4.5%

Table 2 – The different vital pulp therapies for immature permanent teeth

Vital pulp therapies	**Yes**	**No**	**I do not know**
Apexogenesis is a VPT procedure to encourage the physiological development and formation of the root apex	79.5%	13.4%	7.1%
Apexogenesis maintains pulp vitality thus allows continued deposition of dentin	65.2%	28.6%	6.3%
Apexogenesis allows generating dentine bridge at the site of pulpotomy	50.9%	41.1%	8%
Apexification is a method to induce a calcified barrier in a root with open apex	77.7%	15.2%	7.1%
Indirect pulp capping is a procedure performed in a tooth with a deep carious lesion approximating the pulp but without signs or symptoms of pulp degeneration	70.5%	22.3%	7.1%
In indirect pulp capping, the patient returns in 8 to 12 weeks for placement of a permanent coronal restoration	56.3%	32.1%	11.6%

Seven questions were about the materials used in VPT [Table 3]. 70.5% of the students knew about a weak marginal adaptation to dentin and dissolution over time of $Ca(OH)_2$. 76.8% of the participants were aware that MTA promotes better environment for pulpal repair and bridge formation, as compared with $Ca(OH)_2$. Moreover, the rate of the females who answered correctly (70.89%) to this question was significantly higher than the rate of the males (39.47%, p=0.0009). Responses of females and males to other questions were not statistically different, and age of the student did not influence their responses (p>0.05). 51.8% of the participants agreed that if MTA is substituted for $Ca(OH)_2$ in VPT, similar time periods for apical maturation can be anticipated.

71.4% of participants agreed with complete pulpotomy in case of pulp bleeding cannot be controlled after 10 min of direct exposure to NaOCl. Less than half (41.1%) of the students mentioned that NaOCl is a good diagnostic tool which can help to differentiate irreversible changes of pulp and choose the method of pulpitis treatment. Nearly, two-thirds (69.6%) of the participants acknowledged that successful outcomes of VPT decrease with the patient's age.

The majority (64.3%) of the students said that caries marker dyes can be considered a valuable tool to preserve mineralized dentin and to minimize the pulp exposure.

DISCUSSION

University training is a crucial period to acquire concepts in pulp treatment. Despite of the fact that today`s classes and clinical practice might be interrupted by air raids necessitating both teachers and students be in the shelter, the five year dental students in this research had enough number of hours to study pulp diseases in children.

Table 3 – Materials used in VPT

Materials used in VPT	Yes	No	I do not know
The drawbacks of $Ca(OH)_2$ include weak marginal adaptation to dentin, and dissolution over time	70.5%	21.4%	8%
The unique physiochemical properties of MTA promote a superior environment for pulpal repair and bridge formation, compared to $Ca(OH)_2$ products	76.8%	8%	15.2%
In partial pulpotomy: if bleeding cannot be controlled after 10 minutes of direct exposure to NaOCl after removal of unhealthy tissue, complete removal of the coronal pulp to the pulp floor is the preferred option.	71.4%	19.6%	8.9%
Sodium hypochlorite serves as an excellent diagnostic tool to differentiate irreversible from reversible pulpitis and to help determine whether to proceed with partial pulpotomy, complete pulpotomy, or pulpectomy.	41.1%	51.8%	7.1%
Successful outcomes for VPT decrease as the patient's age increases	69.6%	24.1%	6.3%
Caries detector dyes can be considered a valuable tool in caries excavation when attempts are made to preserve mineralizable dentin and to minimize trauma to the pulp	64.3%	27.7%	8%
If MTA is substituted for $Ca(OH)_2$ in VPT procedures, similar time periods for apical maturation can be anticipated	51.8%	31.3%	17%

In 2020–2023, there was a growth in the number of filled permanent teeth due to complicated caries because young patients might delay seeking medical attention [6]. Given this trend and need to enhance tailoring university training on pulp management, it was interesting to assess how far Ukrainian dental students were aware of the VPT. Google Forms have been widely introduced in surveys since Covid 19 appearance [5, 7], therefore, they were chosen for this survey.

VPT plays a crucial role in preserving the permanent teeth with immature root exposed to caries and trauma. Gawthaman et al. [8] reported that tooth apex closure completed approximately 2–3 years after tooth eruption. According guidelines of the International association of dental traumatology for the management of traumatic dental injuries [9], thermal and electric pulp sensibility tests are unreliable for immature permanent teeth. Our findings suggested that 84.9% of the study participants were aware about apex closure and pulp tests indicating good knowledge in this area which was in concordance with the research from Indian university (72 and 64% accordingly) [5].

American Dental Association recommends VPT for teeth diagnosed with a normal pulp or reversible pulpitis [10], last one needs to be introduced in Ukrainian classification [11]. Therefore, the authors modified the item from the questionnaire of Doumani et al. [4] asking the students could teeth with normal pulp or its reversible changes will be treated with pulp cupping or pulpotomy. Almost two thirds of the students knew about the indication to VPT and agreed that the main objective in VPT is to initiate the formation of tertiary dentin or calcific bridge.

Apexogenesis is the continual physiologic development and formation of the root's apex which can be achieved by performing a suitable VPT. Almost 80% of the respondents were aware about this fact, but only 65.2% knew about continued deposition of dentin in apexogenesis, and about 51% mentioned that apexogenesis allows the formation of dentine bridge. Therefore, educators have better explain the essence of apexogenesis.

Pulp necrosis in permanent teeth with immature root has consequences which minimize survival of the tooth. There are a lot of strategies to treat such teeth. Apexification technique induces a hard tissue barrier at the apex of an incompletely formed root with necrotic pulp, and, historically, non-setting calcium hydroxide was used for this purpose [12]. In our study, 77.7% of the participants had knowledge about the apexification definition.

Deep carious lesions can be managed by indirect pulp capping when the tooth does not have signs of pulpitis, and 69.8% of the studied students agreed with this item, which was in concordance with the study of Abhishek et al. [5]. The procedure can be done in one step or two steps, and choice of the method depends on clinical case. 57.5% of the participants agreed that in indirect pulp capping, patient returns after 8–12 weeks for receiving final restoration. Such answer may be explained by their studying only one-appointment treatment of acute deep caries lesions. The authors believe that dental students will familiarize with different clinical options in indirect pulp cupping which will be represented in the new clinical guidelines.

Nowadays, choice of effective treatment agents in different branches of medicine is very relevant [13, 14, 15]. Advanced endodontic developments used in pediatric dentistry [16], and MTA products have showed higher success rate [12]. One of the drawbacks of $Ca(OH)_2$ is weak marginal adaptation to dentin and water solubility. Almost two thirds of the students agreed with these disadvantages of $Ca(OH)_2$ that was in concordance with the study of Abhishek et al. [5]. Similarly, about 77% the students were in favor of superior properties of the MTA in pulp treatment as compared with the $Ca(OH)_2$.

Almost a half of the participants mentioned that the MTA has similar apical maturation period with $Ca(OH)_2$ in VPT. This finding was higher than that reported by Abhishek et al. [5], in which 14% of the dental students knew about the similar attribute of MTA. Obviously, Ukrainian dental students knew much better MTA as a material for root canal treatment of immature permanent teeth than Indian students. NaOCl is an effective nonspecific proteolytic and antimicrobial agent commonly used to stop pulp bleeding during pulpotomy [10]. In this study, less of a half of the participants were aware of the diagnostic importance of the NaOCl in deciding treatment options of partial or complete pulpotomy. Therefore, educators have to emphasize the fact that MTA has similar apical maturation period with $Ca(OH)_2$ in VPT and on diagnostic importance of the NaOCl.

Caries detector dyes play a supreme role in caries removal in order to retain mineralized dentin and minimize pulp exposure. This item was agreed by 64.3% of the participants. However, during the removal of carious lesions, clinicians should combine a selective removal technique and the attentive visual inspection with caries detector dye, which draws affected and infected dentin differently, or other diagnostic method, aside from the dental explorer [17].

Females outperformed males in definition of apexification and understanding the superiority of MTA over $Ca(OH)_2$ in VPT ($p<0.05$).

This study is the first to report the knowledge and attitude of dental students toward VPT of permanent teeth in Ukraine, and has pointed out the knowledge gaps in VPT among them. In spite of favorable findings, the study had same limitations. One limitation that it was conducted at only one university (PSMU), and the outcomes may not be generalizable to other Ukrainian universities. Other limitation was absence of the question about their work experience in treatment permanent teeth with immature root.

CONCLUSIONS

The dental students participated in this study showed mostly good knowledge and attitude toward VPT of young permanent teeth. The main knowledge deficiencies were observed in regards formation of dentine bridge at the site of pulpotomy in apexogenesis, similar apical maturation period of the MTA with $Ca(OH)_2$ in VPT, and use of NaOCl as a diagnostic tool to differentiate between reversible and irreversible state of pulp.

In general, there is a need to improve knowledge and attitude of dental students about the VPT by their familiarization with new clinical guidelines.

PROSPECTS FOR FUTURE RESEARCH

Multi-center studies in different Ukrainian universities are required to increase the generalizability of the results.

AUTHOR CONTRIBUTIONS

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A – Concept and Design
B – Data Collection and Analysis
C – Analysis and Interpretation of Data
D – Writing the Article
E – Critical Review
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The authors did not use AI for writing this article.

REFERENCES

1. Proshchenko NS, Proshchenko NS, Ostapko OI, Plyska OM, & Trokhymets YV. Complicated caries of permanent teeth in children: state of the problem and modern solution ways. Medical perspectives. 2023; 3: 128-136. (Ukrainian). https://doi.org/10.26641/2307-0404.2023.3.289211
2. Zhamardiy VO, Shkola OM, Okhrimenko IM, Strelchenko OG, Aloshyna AI, Opanasiuk FH, Griban GP, Yahodzinskyi VP, Mozolev OM, & Prontenko KV. Checking of the methodical system efficiency of fitness technologies application in students' physical education. Wiad Lek. 2020;73(2):332-341. https://doi.org/10.36740/WLek202002125
3. Gasqui MA, Laforest L, Le Clerc J, Ceinos R, Chemla F, Chevalier V, Colon P, Fioretti F, Gevrey A, Kérourédan O, Maret D, Mocquot C, Ozcan C, Perez F, Terrer E, Turpin YL, Arbab-Chirani R, Doméjean S, & Seux D. Knowledge and Opinions of French Dental Students in Operative Dentistry - Management of Deep Carious Lesions. Oral Health Prev Dent. 2021;19:627-634. https://doi.org/10.3290/j.ohpd.b2403521
4. Doumani MD, Arnous WA, Alsafadi MF, Alnazer HA, Alanazi SM, Alotaibi KS, & Al-Ammari AI. The vital pulp therapy of permanent teeth: A dental practitioner's perspective from Saudi Arabia. J Int Soc Prevent Communit Dent 2020;10:300-8. https://doi.org/10.4103/jispcd.JISPCD_69_19
5. Abhishek N, Mahalakshmi J, & Deepak S. A knowledge, attitude and practice survey regarding pulp therapy among dental students. JCIBG. 2021. 27;2: 2929-2943. Available from: https://cibgp.com/au/index.php/1323-6903/article/view/1198/1176
6. Kaskova LF, Yanko NV, Tovma VV, Vashchenko IY, & Ulasevich LP. 2024. Analysis of dental care indicators for children based on data from the pediatric dental clinic of Poltava city. Actual Problems of the Modern Medicine: Bulletin of Ukrainian Medical Stomatological Academy. 2024; 24 (2): 160-65. (Ukrainian). https://doi.org/10.31718/2077-1096.24.2.160
7. Kaskova LF, Yanko NV, Sadovski MO, Pavlenkova OS,Vashchenko IY, Novikova SC., Ulasevich LP. Assessment of Attitudes and Practices Regarding Oral Healthcare Among the Parents During the War. JIDMR. 2024; 1(17): 203-208. Available from: https://www.jidmr.com/journal/wp-content/uploads/2024/03/33-D23_2925_Yanko_Natalia_Ukraine-Clin.pdf
8. Gawthaman M, Vinodh S, Mathian VM, Vijayaraghavan R, & Karunakaran R. Apexification with calcium hydroxide and mineral trioxide aggregate: Report of two cases. J Pharm Bioallied Sci. 2013 Jul;5(Suppl 2):S131–4. https://doi.org/10.4103/0975-7406.114305
9. Diangelis AJ, Andreasen JO, Ebeleseder KA, Kenny DJ, Trope M, Sigurdsson A, Andersso L, Bourguignon C, Flores MT, Hicks ML, Lenzi AR, Malmgren B, Moule AJ, Pohl Y, & Tsukiboshi M. Guidelines for the Management of Traumatic Dental Injuries: 1. Fractures and Luxations of Permanent Teeth. Pediatr Dent. 2017;39(6):401-411. https://doi.org/10.1111/j.1600-9657.2011.01103.x
10. American Academy of Pediatric Dentistry. Pulp therapy for primary and immature permanent teeth. The Reference Manual of Pediatric Dentistry. Chicago, Ill.: American Academy of Pediatric Dentistry; 2021:399-407. Available from: https://www.aapd.org/media/Policies_Guidelines/BP_PulpTherapy.pdf
11. Kaskova L, Yanko N, Vashchenko I, & Khmil O. Problems of diagnostic of the state of pulp and pulpal diagnoses in children. Wiad Lek. 2024; 77(9): 1763–1768. https://doi.org/10.36740/WLek/191319
12. Ayub K, & Darcey J. Endodontic management strategies for permanent teeth with immature apices. Primary Dental Journal. 2023;12(1):35-42. https://doi.org/10.1177/20501684231154337
13. Chekalina NI, Kazakov YM, Mamontova TV, Vesnina LE, & Kaidashev IP. Resveratrol more effectively than quercetin reduces endothelium degeneration and level of necrosis factor α in patients with coronary artery disease. Wiad Lek. 2016; 69 (3 pt 2): 475-479. Available from: https://pubmed.ncbi.nlm.nih.gov/28478409/
14. Skrypnyk I, Maslova G, Lymanets T, & Gusachenko I. L-arginine is an effective medication for prevention of endothelial dysfunction, a predictor of anthracycline cardiotoxicity in patients with acute leukemia. Exp Oncol. 2017 Dec;39(4):308-311.; Available from: https://exp-oncology.com.ua/pdf/2017/39_4/2376.pdf
15. Pantus AV, Rozhko MM, Paliychuk IV, Kutsyk RV, & Kovalchuk NY. Effectiveness of the application of the developed biopolymer fibrous matrix with cenobone biogel for the reconstruction of bone tissue defects of the jaws. *Georgian Medical News.* 2023:344(11):77–84. Available from: https://pubmed.ncbi.nlm.nih.gov/38236103/
16. Yanko N, Khmil O, Kaskova L, & Vashchenko I. Advanced endodontic developments in pulpectomy of primary teeth. Wiad Lek. 2016; 69(2 Pt 2): 223–227. Available from: https://pubmed.ncbi.nlm.nih.gov/27487538/
17. Abba HM, Idon PI, Udoye CI, & Ikusika OF. Evaluation of residual carious dentin detection methods after cavity preparation: a randomized clinical trial. BMC Oral Health. 2024; 24: 1452. https://doi.org/10.1186/s12903-024-05243-0

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