

FILLING PASTES USED IN PULP THERAPY IN DECIDUOUS TEETH

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Abstract: The study on filling pastes in deciduous teeth generates a great dilemma for the pediatric dentist, as it strongly interferes with the dentition that will come. Thus, it is worth noting that, in endodontic therapy of deciduous teeth, adequate instrumentation, cleaning of the canals and an effective choice must be made associated with filling materials and their correct filling of the dental element. The most used pastes in endodontic treatment are: zinc oxide eugenol (OZE) paste, iodoformed pastes, calcium hydroxide-based paste, iodoformed pastes with calcium hydroxide and CTZ paste. The choice of material to be used must be based on the properties of each substance that it composes and the scientific evidence that supports the use of these materials. Therefore, this work aims to review the literature on filling pastes with indication for pulp treatment of deciduous teeth. This is a literature review through scientific articles and periodicals, in the “PubMed” and “SciELO” databases, published between January 2017 and December 2021. The filling pastes play an essential role in the repair of the dental element, maintaining the objective that it develops with normal biological patterns. The choice of this material is extremely important when we talk about physiological root resorption, as the paste needs to have criteria that do not interfere with the natural process. In view of the above, the success of endodontic treatment does not depend only on the material used, but it is a compilation of a detailed anamnesis, precise clinical and radiographic exams, a correct diagnosis, as well as, cautious performance of the operative technique and follow-up of the patient, keeping that deciduous tooth in the mouth until its physiological exfoliation.

Keywords: Endodontics, Pulpectomy, deciduous teeth.

INTRODUCTION

Dental caries is a disease with an impact on global public health that often affects children in early childhood, with an impact on GENERAL AND ORAL HEALTH (FINUCANE, 2012, MATHUR, DHILLON 2017). When tooth decay reaches the pulp, one or more of the following signs and symptoms may occur, such as: spontaneous pain, especially when lying down; chewing pain; intraoral edema or intraoral sinus tract formation (RODD et al., 2006). In these cases, extraction or pulpectomy is chosen as treatment (MOSKOVITZ, et al., 2005). Pulpectomy has been a treatment option since 1932 to preserve the primary tooth (KUBOTA, GOLDEN AND PENUGONGA, 1992).

Pulpectomy is a pulp therapy for teeth with irreversible pulp involvement or pulp necrosis, with a clear periapical/interradicular lesion, radiographically visible (MASSARA et al., 2017). In primary teeth, pulpectomy has certain particularities that differentiate it from permanent teeth. As the deciduous teeth have curved canals, and the presence of accessory canaliculi, making the instrumentation technique difficult. Physiological root resorption makes the determination of the apical limit difficult, preventing both instrumentation and filling of the canals (PINHEIRO et al., 2013).

The success of endodontic treatment of deciduous teeth results entirely from the accurate performance of all operative steps (SILVA et al., 2010), including the removal of irreversibly inflamed or necrotic root pulp tissue, cleaning of the root canal system and filling with resorbable material. (RODD et al., 2006). Furthermore, it is believed that the removal of the smear layer during the chemical-mechanical preparation of the canal improves the results of pulpectomy in primary teeth (BARCELOS et al., 2012).

Many clinical studies have been carried out to investigate the effectiveness of different filling techniques and filling materials for primary teeth (LIMA, 2020; PILGER, 2021), however, there is no way to point out the superiority of a particular material compared to another, considering that each has its advantages and disadvantages (PILGER, 2021). In addition, due to the particularities of the root canal system in primary teeth, it is still a challenge to provide a complete seal to these elements (ARAGÃO et al., 2019).

The standards necessary for a filling material for primary teeth to be ideal are: having a degree of resorption similar to the root of the primary tooth, being innocuous to the periapical tissues and the germ of the permanent tooth, being resorbed when extravasated, having antiseptic properties, being of easy handling, having good adhesion to the walls of the canals, being easily removed, if necessary, being radiopaque and not pigmentation the tooth (CUNHA et al., 2005). However, at the moment, there is no ideal material that meets all these requirements (RAMAR et al., 2010).

From this, the most used pastes in pediatric dentistry in endodontic treatment are divided into: zinc oxide and eugenol (OZE) pastes, iodoformed pastes, calcium hydroxide-based pastes, iodoformed pastes with calcium hydroxide and CTZ paste. (chloramphenicol, tetracycline and zinc oxide and eugenol). The choice of material to be used must be inserted in the properties of each substance that composes and the scientific evidence that supports the use of these materials (PILGER, 2021).

Some systematic reviews contribute to similar results among the materials indicated for filling primary teeth, in terms of clinical performance and resorption capacity (BARCELOS et al., 2011; BARJA-FIDALGO et al., 2011). It is a fact that it would be of

fundamental importance for endodontics that materials and pastes were evaluated for their tissue compatibility. However, there is no evidence, due to the scarcity of scientific works, attesting to the superiority of a certain material filling the root canals of deciduous teeth over another (MASSARA et al., 2017).

The study on filling pastes in deciduous teeth generates a dilemma for pediatric dentistry. It is noteworthy that, in order to preserve the tooth in adequate functional conditions until tooth replacement, the course of the technique must be performed judiciously (PILGER et al., 2021).

However, the literature is still insufficient on these filling materials, with no systematization of protocols and a diversity of lines of study. Therefore, this work aims to review the literature on filling pastes with indication for pulp treatment of deciduous teeth.

METHODOLOGY

This is a literature review through scientific articles and journals, in the “PubMed”

and “SciELO” databases, published between January 2017 and December 2021. The research descriptors used were “Endodontics”, “Pulpectomy”, “Deciduous Teeth” and “Pediatric Dentistry”, being referred to in English as “Endodontics”, “Pulpectomy”, “Deciduous Tooth” and “Pediatric Dentistry”. The inclusion criteria that guided the search were: current publication, relevance and direct correlation with our objective, references of entities and publications, in addition to the type of work performed. Duplicate articles, available only in abstract form, which did not directly address the proposal studied or did not meet the other inclusion criteria were excluded. The results were presented in the form of a table, in a descriptive way, divided into thematic categories, which addressed the types of filling pastes, their composition and their method of preparation.

RESULTS

Table 1.

PASTES	COMPOSITION	PREPARATION
CTZ paste	Tetracycline + chloramphenicol + zinc oxide and eugenol.	Proportion 1:1:2 (500mg of Chloramphenicol, 500mg of Tetracycline and 1,000mg of Zinc Oxide) and incorporated into the eugenol liquid at the time of use.
Guedes Pinto	Iodoform, camphorated paramonochlorophenol and rifocort.	Mix 1 measure of iodoform, 3 drops of camphorated paramonochlorophenol and 1 cm of ricofort.
Vitapex	Calcium Hydroxide (30%) + Iodoform (40%) + Silicone Oil (20%).	Pre-mixed Calcium Hydroxide + Iodoform paste. It comes in a 2g syringe + 20 disposable tips.
Endoflas	Iodoform, calcium hydroxide, zinc oxide, barium sulfate, eugenol and camphorized paramonochlorophenol.	Mixing 0.5 grams of powder and 5 drops of liquid.
Calen Paste thickened with OZE	Calcium hydroxide (49%) + zinc oxide (thickened).	Mixture of 1g of Calen plus 0.65g of zinc oxide.
OZE Paste	zinc oxide, eugenol and glacial acetic acid).	0.5g of powder added by mixing to 9 drops of liquid.

Table 1: Filling pastes with their composition and method of preparation

Source: Table adapted from PILGER, 2021 (p21)

DISCUSSION

Pulp therapy in primary teeth, according to Araújo et al. (2010) can be conservative, when priority is given to pulp vitality of the entire tooth, or the root part; and it can be radical, when all the pulp is removed.

In this context, when pulpectomy is chosen, Azevedo; Barcelos and Primo (2009) highlighted the importance of carrying out an adequate sanitization of the root canals, accompanied by satisfactory obturation for the success of the treatment. For this, these authors, together with Silva; Brum; Soares (2013) corroborated that mechanical and chemical preparation of root canals must be performed.

The filling pastes play an essential role in the repair of the dental element, maintaining the objective that it develops with normal biological patterns. The choice of this material is extremely important when we talk about physiological root resorption. Because the paste needs to have criteria that do not interfere with the natural process (CUNHA et al., 2005; KOPPER, 2021).

The CTZ paste (Chloramphenicol, tetracyclines, zinc oxide and eugenol) is an alternative option that has been frequently used for the treatment of deciduous teeth, both in cases of pulp necrosis and pulpitis, with remarkable clinical and radiographic success rates. . Among its mechanisms of action, it has antibacterial power against microorganisms such as: *Enterococcus faecalis* and *Streptococcus aureus* and a number of others. In addition, it does not cause sensitivity in the surrounding tissues, it does not change the blood cells in the alveolus region. (FERREIRA et al., 2019; MOURA et al., 2021).

In this context, the CTZ paste has a simple handling method and its technique can be performed in a short period of time, not requiring instrumentation or absolute isolation, something very relevant for the

management of less cooperative pediatric patients. Furthermore, it has a satisfactory biocompatibility, similar to that of calcium hydroxide paste. However, a possible disadvantage is that the use of this substance can cause pigmentation of the crown of the tooth where it is applied (MOURA et al., 2018; OLIVEIRA et al., 2021).

The Guedes-Pinto paste, according to WEISS (2008), is widely used by Brazilian Dental Universities, exceeding 90% of use in pulpectomy cases. It is composed of three main actives, divided equally for the preparation of the paste, which are: iodoform with antimicrobial and antiseptic properties, being an ideal material for filling deciduous teeth, as it is easily reabsorbed by the tissues, camphorated paramonochlorophenol, which, in turn, acts as an antimicrobial and analgesic compound and, finally, ricofort (rifamycin), being an anti-inflammatory and antibiotic (CERQUEIRA et al., 2007; PILGER et al., 2021,). Guedes-Pinto paste is highly used due to the positive results shown by it in several studies that demonstrate its great antimicrobial potential, low tissue cytotoxicity and its effectiveness in endodontic therapy of deciduous teeth (AMORIM et al., 2006, MELLOMOUR et al, 2007).

With regard to Vitapex, it has been a filling paste widely used in pulpectomy treatments in deciduous teeth, but recent research has shown a not very interesting behavior in relation to its resorption time during the patient follow-up period. resorbs faster than the tooth root (CHEN et al., 2017). Ramar shows that 56.6% of the Vitapex-treated teeth that were evaluated in his research had material resorption occurring faster than root resorption within a 9-month period.

Chen in his study, evaluates that when Vitapex reabsorbs faster than the tooth root, 55% of the treated teeth failed in the radiographic evaluation, of these, 61% clinical

signs reappear and symptoms return to patients (CHEN et al. , 2017).

Calcium Hydroxide and Iodoform Paste is a possible alternative for endodontic treatment in primary dentition, so it is essential to know its particularities and similarities about the actives in question. Calcium Hydroxide is widely used due to its biological and antimicrobial properties, so Iodoform, which acts through the release of iodine, was added thinking about potentiating this paste due to its antimicrobial action, its healing and resorbable properties (NAJJAR et al. al., 2019; NAVIT et al., 2016). According to Zacharczuk (2019) and Najjar (2019), this association provides an alkaline paste, with antimicrobial potential, biocompatibility, increased radiopacity of the material, in view of the deficiency of calcium hydroxide at this point and simplification during application in the conduits. On the other hand, some studies have not shown effective antimicrobial action, being inferior to other filling pastes (JARA et al., 2020).

Endoflas, which contains calcium hydroxide, zinc oxide, barium sulfate, eugenol, triiodomethane and camphorated paramonochlorophenol, is a resorbable paste that can disinfect dentinal tubules and accessory canals where access is mechanically easier. hampered (Chen et al, 2017; Deepaket al, 2021). In agreement with the studies by Deepak et al (2021), the Endoflas paste, due to the presence of Eugenol and Iodoform in its composition, has better antimicrobial properties, compared to OZE (Zinc Oxide and Eugenol), also in agreement with studies by Kaiwaret al. and Navitet al. In addition, when compared to other filling materials, Endoflas has good microbial effectiveness against *E. faecalis* (Chen et al, 2017).

Calen paste has good to moderate cytocompatibility, with low impact on the release of pro-inflammatory cytokines and on

the induction of growth factors of interest for tissue repair. And in the primary dentition, it is suggested that this paste may contribute to bone repair in clinical situations of apical periodontitis in children (PINTOR et al., 2021).

The ideal paste must be biocompatible with periapical tissues and permanent successor teeth, stimulating tissue repair and calen paste among the beneficial properties of calcium hydroxide are its biocompatibility, antibacterial activity, induction of mineralized tissue formation and easy resorption. When used alone, Calen paste presents biocompatibility, so when an inflammatory reaction occurs, it can be attributed to the higher concentration of zinc in the material, since zinc has the ability to influence the inflammatory process by reducing the phagocytic capacity of macrophages and interfering with the membrane of lysosomes (PILOWNIC et al., 2017; PINTOR et al., 2021).

Eugenol zinc oxide (OZE) has traditionally been used as a root filling material in pulpectomy of primary teeth. As discussed in the study by Najjar et al., 2019, OZE or OZE/iodoform combined with $\text{Ca}(\text{OH})_2$ (Calcium hydroxide) would be the most suitable material for pulpectomy in primary teeth which still need to remain in the mouth for a long time. before exfoliation, and the choice of filling material is of paramount importance for the success of the procedure in question. (NAJJAR et al., 2019).

The result of pulpectomy in the study by Drukteinis et al 2021 differs significantly due to the choice of filling material, with the lowest success rates when using calcium hydroxide, yet the best were associated with iodoform, zinc oxide-iodoform or oxide formulations. of zinc-eugenol. Numerous cases of ectopic eruption of primary teeth have been observed after ZOE pulpectomy. Thus, many filling materials, used in pediatric endodontics, do

not resorb as expected and the material remains are detectable on radiographs up to several months after exfoliation of an endodontically treated deciduous tooth. (DRUKTEINIS et al., 2021). According to the study by Gadallah et al 2019, there was no conclusive evidence that certifies the superiority of a material for use in pulpectomy of deciduous teeth. (GADALLAH et al 2019).

CONCLUSION

Based on advances and research on different endodontic filling pastes in pediatric dentistry, we can conclude that the CTZ paste is an accessible and easy-to-use paste, not requiring canal instrumentation, being a favorable option in difficult-to-manage children, leading to a fast and efficient treatment. It achieves excellent effects when monitored clinically and radiographically.

However, there are no clinical studies that show this.

The Calcium Hydroxide-Based Paste is a paste that has indications in the literature, one of its benefits is its easy application during filling. Guedes Pinto paste is the safest and has the most scientific evidence in Pediatric Dentistry to date, having antiseptic characteristics that reduce its anti-inflammatory reaction after treatment and is resorbable.

In view of the above, the success of endodontic treatment does not depend only on the material used, but it is a compilation of a detailed anamnesis, precise clinical and radiographic exams, a correct diagnosis, as well as, cautious performance of the operative technique and follow-up of the patient, keeping that deciduous tooth in the mouth until its physiological exfoliation.

REFERENCES

- AMORIM, L.D.F.G., Todelo, O. A, Estrela, C.R.D.A, Decurcio, D.D.A; Estrela C. **Antimicrobial analysis of different root canal filling pastes used in pediatric dentistry by two experimental methods.** Braz Dent J, v.17,n. 4, p. 317-322, 2006.
- ANTONIAZZI, B.F; PIRES, C.W; BRESOLIN, C.R; WEISS, R.N; PRAETZEL, J.R. **Antimicrobial activity of different filling pastes for deciduous tooth treatment.** Original Research Pediatric Dentistry, v. 29 n. 1, p. 1-6, 2015.
- ARAGÃO, Amanda Carneiro et al. **Root canal obturation materials and filling techniques for primary teeth: in vitro evolution in polymer: based prototyped incisors.** International Journal Of Paediatric Dentistry, v. 30, n.3, p. 381-389, 20 dez. 2019.
- ARAÚJO, F. B. et al. **Terapia pulpar em dentes decíduos e permanentes jovens.** Manual de referência abo-odontopediatria, 2010. p. 194-210.
- AZEVEDO, C. P.; BARCELOS, R.; PRIMO, L. **Variabilidade de técnicas de tratamento endodôntico em dentes decíduos: uma revisão de literatura.** Arquivos em Odontologia, v. 45, n. 1, p. 37-43, jan./mar. 2009.
- Barcelos R, Santos MP, Primo LG, Luiz RR, Maia LC. **ZOE paste pulpectomies outcome in primary teeth: a systematic review.** J ClinPediaterDent. 2011 Spring;35(3):241-8.
- Barcelos R, Tannure PN, Gleiser R, Luiz RR, Primo LG. **The influence of smear layer removal on primary tooth pulpectomy outcome: a 24-month, double-blind, randomized, and controlled clinical trial evaluation.** Int J Paediatr Dent. 2012 Sep;22(5):369-81. <https://doi.org/10.1111/j.1365-263X.2011.01210.x>
- Barja-Fidalgo F, Moutinho-Ribeiro M, Oliveira MA, de Oliveira BH. **A systematic review of root canal filling materials for deciduous teeth: is there an alternative for zinc oxide-eugenol?** ISRN Dent. 2011;2011:367318.
- CERQUEIRA, D.F; MELLO-MOURA, A.C.V; SANTOS, E.M; GUEDES-PINTO, A.C. **Cytotoxicity, Histopathological, Microbiological and Clinical Aspects of an Endodontic Iodoform-Based Paste Used in Pediatric Dentistry: A Review.** The Journal of Clinical Pediatric Dentistry, v. 32, n. 2, p. 105-110, 2007.

CHEN, X; LIU, X; ZHONG, J. **Clinical and radiographic evaluation of pulpectomy in primary teeth: a 18-months clinical randomized controlled trial.** *Head & Face Medicine*, v. 13, n. 12, p. 1-10, 2017.

CUNHA, C.B.C.S. **Adaptação de pastas obturadoras nos canais radiculares de dentes decíduos.** 2005.

DEEPAK, B.M; PRABHAKAR, A.R; KARUNA, Y.M; SUGANDHAN, S; ZAHOR, N; SHAGALE, A.M. **Evaluation of the Antibacterial Activity of Triclosan-incorporated Root Canal Filling Materials for Primary Teeth against Enterococcus faecalis.** *International Journal of Clinical Pediatric Dentistry*, v. 14, n. 3, p. 393-397, 2021.

Drukteinis, S., Drukteinienė, A., Drukteinis, L., Martens, L. C., & Rajasekharan, S. **Flowable Urethane Dimethacrylate-Based Filler for Root Canal Obturation in Primary Molars: A Pilot SEM and microCT Assessment.** *Children*, 8(2), 60, 2021.

FEREIRA, J.L; JIMÉNEZ, S.A; MEDRANO, L.E.C; GARCIA, I.T; ÁLVAREZ, M.A. **Clinical and Radiographic Evaluation of Formocresol and Chloramphenicol, Tetracycline and Zinc Oxide-Eugenol Antibiotic Paste in Primary Teeth Pulpotomies: 24 month follow up.** *The Journal of Clinical Pediatric Dentistry*, v. 43, n. 1; p. 1-6, 2019.

Finucane, D. Rationale for restoration of carious primary teeth: A review. *Journal of the Irish Dental Association*, 58, 31–42, 2012

Gadallah, L., Hamdy, M., El Bardissy, A., & Abou El Yazeed, M. **Pulpotomy versus pulpectomy in the treatment of vital pulp exposure in primary incisors. A systematic review and meta-analysis,** 2018.

Jara, M., Salcedo-Moncada, D., Ayala, G., Watanabe, R., Alvitez-Temoche, D., & Mayta-Tovalino, F. **Antibacterial efficacy of calcium hydroxide with iodoform versus calcium hydroxide with camphorated paramonochlorophenol as intrachannel pastes on an Enterococcus faecalis biofilm: A comparative in vitro study.** *Journal of International Society of Preventive & Community Dentistry*, 10(5), 555, 2020.

JUNQUEIRA, M.A; CUNHA, N.N.O; CAIXETA, F.F; MARQUES, N.C.T; OLIVEIRA, T.M; MORETTI, A.B.S; COMES-SILVA, L; SAKAI, V.T. **Clinical, Radiographic and Histological Evaluation of Primary Teeth Pulpotomy Using MTA And Ferric Sulfate.** *Brazilian Dental Journal*, v. 29, n. 2, p. 159-165, 2018.

KAIWAR, A; NADIG, G; HEGDE, J; LEKHA, S. **Assessment of Antimicrobial Activity of Endodontic Sealers on Enterococcus faecalis: An in vitro Study.** *World J Dent*, v. 3, n. 1, p. 26-31, 2012.

KOPPER, T.E. **Análise das propriedades físico/químicas de um material obturador para dentes decíduos.** 2021. 56 f. Trabalho de Conclusão de Curso (Cirurgião-dentista). Curso de Odontologia. Universidade de Passo Fundo, Passo Fundo, 2021.

Kubota, K., Golden, B. E., & Penugonda, B. **Root canal filling materials for primary teeth: A review of the literature.** *ASDC Journal of Dentistry for Children*, 59, 225–227, 1992.

LIMA, I. R. D. **Materiais obturadores utilizados em pulpectomias de dentes decíduos: revisão de literatura.** 2020. 44 f. TCC (Graduação em Odontologia) - Faculdade de Farmácia, Odontologia e Enfermagem, Universidade Federal do Ceará, Fortaleza, 2020.

MASSARA, M.A; et al. **Manual de Referência para procedimentos Clínicos em Odontopediatria.** 2ed. Cap. 17. São Paulo: Santos, 2017.

MELLO-MOURA, A.C.V; CERQUEIRA, D.F; SANTOS, E.M. **Pasta Guedes-Pinto: Revisão de literatura: 26 anos de estudo sobre citotoxicidade, citotóxicos, histopatológicos, microbiológicos e clínicos.** *RPG. Rev. Pós-Grad*, v. 14, n. 3, p. 260-266, 2007.

Moskovitz, M., Sammara, E., & Holan, G. **Success rate of root canal treatment in primary molars.** *Journal of Dentistry*, 33, 41–47 2005. [https:// doi.org/10.1016/j.jdent.2004.07.009](https://doi.org/10.1016/j.jdent.2004.07.009)

MOURA, J; LIMA, M; NOGUEIRA, N; CASTRO, M; LIMA, C; MOURA, M; MOURA,L. **LSTR Antibiotic Paste Versus Zinc Oxide and Eugenol Pulpectomy for the Treatment of Primary Molars with Pulp Necrosis: A Randomized Controlled Trial.** *Pediatr Dent*, v. 43, n. 6, p. 435-442, 2021.

MOURA, L.F.A.D; LIMA, M.D.M; LIMA, C.C.B; BANDEIRA, A.V.L; MOURA, M.S; JÚNIOR, A.M.C; RIZZO, M.S. **Cellular profile of primary molars with pulp necrosis after treatment with antibiotic paste.** *International Journal of Experimental Pathology*, p. 1-5, 2018.

Najjar, R. S., Alamoudi, N. M., El-Housseiny, A. A., Al Tuwirqi, A. A., & Sabbagh, H. J. (2019). **A comparison of calcium hydroxide/iodoform paste and zinc oxide eugenol as root filling materials for pulpectomy in primary teeth: A systematic review and meta-analysis.** *Clinical and experimental dental research*, 5(3), 294-310.

NAVIT, S; JAISWAL, N; KHAS, S.A; MALHOTRA, S; SHARMA, A; MUKESH; JABEEN, S; AGARWAL, G. **Antimicrobial Efficacy of Contemporary Obturating Materials used in PrimaryTeeth- An In-vitro Study.** *Journal of Clinical and Diagnostic Research*, v. 10,n. 9, p. 09-12, 2016.

OLIVEIRA, S.C.M; FLORIANI, I; TEDESCO, T.K; GIMENEZ, T; IMPARATO, J.C.P; CALVO, A,F,B. **Cost analysis of endodontic treatment in primary teeth: results from a randomized clinical trial.** *Braz. Oral Res*, v. 35, n. 126, p. 1-11, 2021.

PILGER, A.L. Pastas obturadoras em dentes decíduos: uma revisão de literatura. 2021.63 f. TCC (Graduação em Odontologia) – Universidade de Passo Fundo, Passo Fundo,2021.

Pilownic, K. J., Gomes, A. P. N., Wang, Z. J., Almeida, L. H. S., Romano, A. R., Shen, Y., ... & Pappen, F. G. **Physicochemical and biological evaluation of endodontic filling materials for primary teeth.** *Brazilian dental journal*, 28, 578-586, 2017.

PINHEIRO, Helder Henrique Costa et al. **Terapia Endodôntica em Dentes Decíduos por Odontopediatras.** *Pesquisa Brasileira em Odontopediatria e Clínica Integrada*, v. 13, n. 4, p. 351-320, 2013.

Pintor, A. V. B., Queiroz, L. D., Sancas, M. C., Brochado, A. C. B., Spoladore, J., Fonseca-Gonçalves, A., & Alves, G. G. **Cytocompatibility of filling pastes by primary teeth root simulating model.** *Odontology*, 109(1), 174-183, 2021.

RAMAR, K; MUNGARA, J. **Clinical and radiographic evaluation of pulpectomies using three root canal filling materials: an in-vivo study.** *J Indian Soc Pedov Prev Dent*, v 28, n 1, p. 25-29. Jan-Mar, 2010.

Rodd, H. D., Waterhouse, P. J., Fuks, A. B., Fayle, S. A., & Moffat, M. A. (2006). **Pulp therapy for primary molars.** *International Journal of Paediatric Dentistry*, 16, 15–23. <https://doi.org/10.1111/j.1365-263X.2006.00774.x>

Silva LA, Leonardo MR, Oliveira DS, Silva RA, Queiroz AM, Hernández PG et al. **Histopathological evaluation of root canal filling materials for primary teeth.** *Braz Dent J*. 2010 Jan;21(1):38-45. <https://doi.org/10.1590/S0103-64402010000100006>

SILVA, T. V.; BRUM, S. C.; SOARES, L. C. **Análise antimicrobiana de soluções irrigadoras em endodontia de dentes decíduos.** *Rev. Odontol. UNESP*, v. 41, n. 2, p. 130-137, 2013.

Zacharczuk, G. A., Toscano, M. A., López, G. E., & Ortolani, A. M. **Evaluation of 3Mix-MP and pulpectomies in non-vital primary molars.** *Acta odontologica latinoamericana: AOL*, 32(1), 22-28, 2019.