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E-mail: kaviyagopinath@gmail.com
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Comparative evaluation of LSTR medicaments in primary molars: A randomized controlled trial

Garima Singh* & Somya Govil

Department of Pediatric and Preventive Dentistry, Babu Banarasi Das College of Dental Sciences, Babu Banarasi Das University, Lucknow, Uttar Pradesh, India; *Corresponding author

Affiliation URL:
https://bbdu.ac.in/

Author contact:
Garima Singh - E-mail: gs0843092@gmail.com
Somya Govil - E-mail: drsomyagovil@gmail.com

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Abstract:
LSTR therapy is a minimally invasive approach for managing infected primary molars, but the relative performance of different intracanal medicaments remains uncertain. This randomized controlled trial included 45 primary molars in 45 systemically healthy children aged 4–9 years, randomly allocated to GAM paste (Group A), Ledermix paste (Group B) or Endoflas paste (Group C) with 15 teeth per group. Clinical and radiographic outcomes were assessed at 1 week, 1 month, 3 months, 6 months and 12 months and clinical, radiographic and overall success were compared among the groups. At 12 months, Group B showed the highest clinical success (85.7%), radiographic success (92.9%) and overall success (85.7%), followed by Group C (73.3%, 80.0% and 73.3%, respectively) and Group A (53.8%, 46.2% and 46.2%, respectively), with statistically significant intergroup differences ($p<0.05$). Thus, ledermix paste showed the most favorable 12-month clinical and radiographic outcomes among the three medicaments, followed by Endoflas, whereas GAM paste showed progressive deterioration after 6 months.

Keywords: Lesion sterilization and tissue repair (LSTR) therapy, primary molars, GAM paste, ledermix paste, endoflas paste, intracanal medicament, randomized controlled trial (RCT)

Background:
The preservation of primary teeth until natural exfoliation is important for maintaining arch length, guiding eruption of permanent successors and supporting mastication and speech **[1]**. Premature loss of primary teeth may result in space loss, altered eruption, malocclusion and functional disturbances **[1]**. Dental caries in primary teeth may progress rapidly because of their anatomical characteristics and the close relationship between the pulp and external tooth surface **[2]**. Untreated caries may lead to irreversible pulpitis, pulpal necrosis and furcation or periapical pathology **[2, 3]**. Accessory canals in the furcation region of primary molars can facilitate the spread of infection to the supporting tissues and complicate endodontic treatment **[3]**. Pulpectomy is commonly used for primary teeth with necrotic pulp and periradicular involvement; however, complex root canal anatomy, physiological root resorption, proximity of the permanent successor, treatment time and child cooperation may influence treatment predictability **[4, 5]**. LSTR therapy was developed as a conservative approach based primarily on chemical disinfection with antibacterial medicaments placed in the pulp chamber or root canal system with minimal instrumentation **[3, 6 and 7]**. The biological rationale for LSTR is based on the recognition that a combination of antibacterial agents may be required to address the diverse microorganisms present in infected root canal dentin **[8, 9]**. Triple antibiotic formulations and their modified combinations have subsequently been investigated in primary teeth, while concerns regarding antibiotic resistance and tooth discoloration have encouraged the evaluation of alternative medicaments **[10, 11 and 12]**. GAM paste combines gentamicin, amoxicillin and metronidazole, whereas Ledermix contains demeclocycline and triamcinolone acetonide; Endoflas contains zinc oxide, eugenol, iodoform and calcium hydroxide and is used as a resorbable obturating material **[10, 13]**. Therefore, it is of interest to compare the clinical and radiographic outcomes of GAM, Ledermix and Endoflas used as intracanal medicaments for LSTR therapy in primary molars over a 12-month follow-up period.

Materials and Methods:
This prospective, parallel-group, randomized controlled trial was conducted in the Department of Pediatric and Preventive Dentistry, Babu Banarasi Das College of Dental Sciences, Lucknow, India. The pilot study was initiated in September 2024. Ethical approval was obtained from the Institutional Ethics Committee (IEC Code: 22, dated 22/04/2025). The participants of the pilot work were also included in the study sample. Written informed consent was obtained from parents or guardians and child assent was obtained where applicable. Systemically healthy children aged 4–9 years requiring endodontic treatment for primary molars were recruited from the outpatient department. Inclusion criteria were children aged 4–9 years with primary molars having irreversible pulpitis with furcation or periapical involvement (radiographically evident radiolucency) and no history of spontaneous pain subsiding completely. Exclusion criteria were primary teeth nearing physiological exfoliation (less than two-thirds root length remaining), children with infective endocarditis or immune compromised status, excessive internal or external root resorption, swelling extending to extraoral tissues and known allergy to any study medicament component. A total of 45 primary molars (one per child) were enrolled. Sample size calculation was based on an expected 30% difference in success rates among groups ($\alpha=0.05$, $\beta=0.20$, power=80%). Simple random allocation was performed using a colored pencil method: a box containing 15 blue, 15 red and 15 yellow pencils; participants picked a pencil, with blue representing GAM paste (Group A), red representing Ledermix paste (Group B) and yellow representing Endoflas paste (Group C). This ensured was bias sample allocation concealment. All procedures were performed by a single operator. Local anesthesia (2% lignocaine with 1:80,000 adrenalines) was administered and the tooth was isolated with a rubber dam. Access cavity preparation was performed using a sterile round bur in a high-speed handpiece. Necrotic coronal pulp tissue and accessible radicular pulp remnants were removed using short barbed broaches. No attempt was made to instrument the canals completely. The pulp chamber and canals were irrigated alternately with 1% sodium hypochlorite and normal saline, followed by EDTA to eliminate the smear layer and facilitate medicament penetration. Based on group allocation, the prepared medicament was placed into the pulp chamber and canal orifices using a sterile instrument. The access cavity was sealed with glass ionomer cement (GC Fuji Type 2), followed by stainless steel crown (3M ESPE) placement

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for coronal seal and functional restoration. For Group A (GAM Paste), gentamicin, amoxicillin and metronidazole tablets were pulverized separately, mixed in equal proportions (1:1:1) and blended with propylene glycol to achieve a creamy consistency. For Group B (Ledermix Paste), demeclocycline hydrochloride (3%) and triamcinolone acetonide (1%) were triturated with calcium hydroxide (48%) and zinc oxide (48%) and then mixed with propylene glycol before application. For Group C (Endoflas Paste), commercial Endoflas powder (zinc oxide 56.5%, iodoform 40.6%, calcium hydroxide 1.4% and barium sulphate 1.5%) was mixed with propylene glycol on a sterile glass slab **[13]**. The primary outcome was overall success at 12 months (combined clinical and radiographic success). Secondary outcomes were clinical success (absence of pain, swelling, sinus tract, tenderness on percussion and pathological mobility) and radiographic success (resolution or reduction of furcation radiolucency, absence of new pathologic root resorption). Clinical and radiographic evaluations were performed at 1 week, 1 month, 3 months, 6 months and 12 months postoperatively by two blinded evaluators independently; disagreements were resolved by consensus. Data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). The normality of continuous data distribution was assessed using the Shapiro-Wilk test. Since the data were not normally distributed, non-parametric tests were employed. For intragroup comparisons of clinical and radiographic parameters over multiple time points (pre-operative, 1 week, 1 month, 3 months, 6 months and 12 months) **(Figure 1, 2 and 3)**, the Friedman test for repeated measures was used, followed by post-hoc pairwise comparisons with Bonferroni correction where appropriate. For intergroup comparisons of categorical variables (clinical success, radiographic success, overall success and individual clinical parameters at each time point), the Chi-square test was used; Fisher's exact test was applied when any expected cell frequency was less than 5. A p-value of less than 0.05 was considered statistically significant for all analyses.

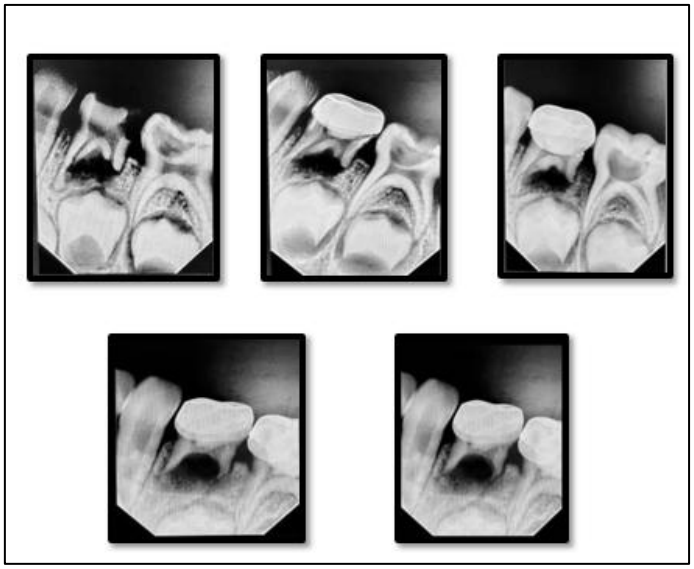


Figure 1: Clinical and radiographic evaluation of tooth i.r.t 74 in Group A – GAM: Pre-operative intraoral photograph, Post-operative intraoral photograph, Pre-operative IOPAR, 1week follow-up , 3months follow-up , 6months follow-up and 12months follow-up

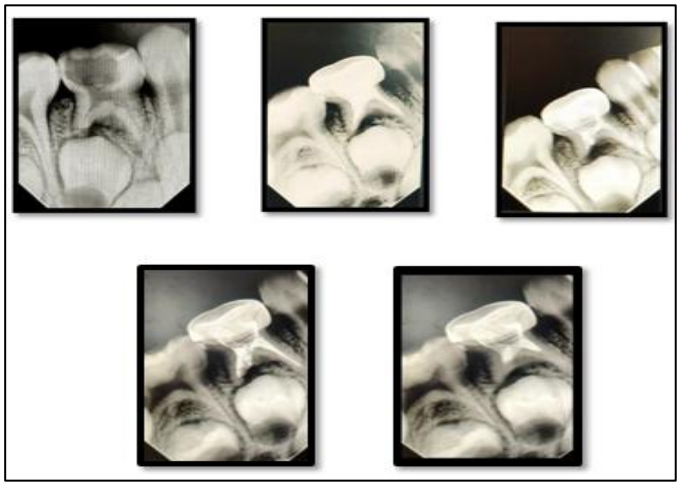


Figure 2: Clinical and radiographic evaluation of tooth i.r.t 84 in Group B - LEDERMIX PASTE: Pre-operative intraoral photograph, Post-operative intraoral photograph, Pre-operative IOPAR, 1 week follow-up, 3 months follow-up, 6 months follow-up and 12months follow-up

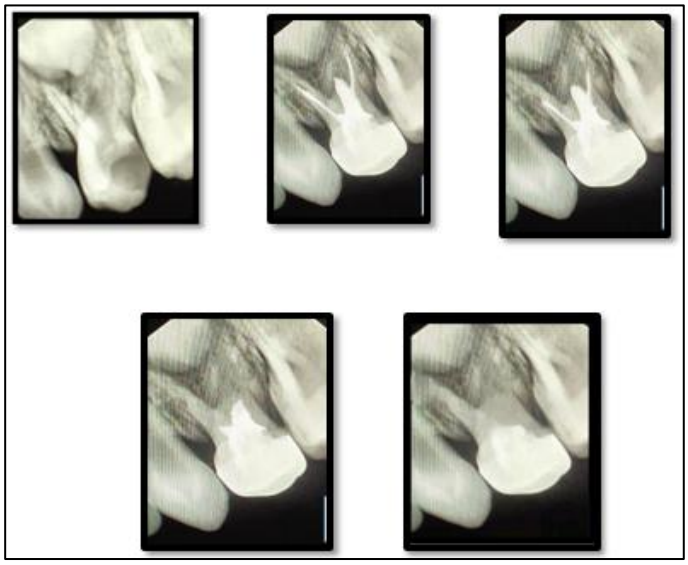


Figure 3: Clinical and radiographic evaluation of tooth i.r.t 64 in Group C- ENDOFLAS PASTE: Pre-operative intraoral photograph, Post-operative intraoral photograph, Pre-operative IOPAR, 1week follow-up, 3months follow-up, 6months follow-up and 12-months follow-up

Results:

Forty-five children (45 primary molars) were enrolled and randomized. Five participants were lost to follow-up by 12

months (11.1% attrition): two from Group A (13.3%), two from Group B (13.3%) and one from Group C (6.7%). Baseline characteristics were comparable across groups **(Table 1).** The mean age was 6.50±1.24 years in Group A, 6.73±1.39 years in Group B and 6.10±1.51 years in Group C (overall 6.44±1.38 years). Gender distribution showed male predominance in Group A (73.3%) and Group C (73.3%), while Group B had 60% females; differences were not significant (p=0.094). Pain and tenderness (100% preoperatively) resolved completely at 1 week, 1 month and 3 months but recurred in 38.5% at 6 months and further increased to 53.8% at 12 months (p<0.001). Swelling and sinus tract (40% preoperatively) resolved initially, reappeared in 30.8% at 6 months and increased to 46.2% at 12 months (p=0.008). Mobility showed progressive increase from 6.7% preoperatively to 30.8% at 12 months, though this did not reach statistical significance (p=0.094). Complete resolution of pain, swelling, sinus tract and tenderness was observed from 1 week through 6 months. At 12 months, mild recurrence occurred in 14.3% of cases for pain and tenderness, while swelling and sinus tract remained completely absent (p<0.001 for all parameters). No significant mobility changes were observed (p=0.421). Significant improvement in all parameters was observed from the first follow-up onward. Pain and tenderness recurred in one case (6.7%) at 6 months, increasing to two cases (13.3%) at 12 months. Swelling and sinus tract remained absent at all follow-up time points. No significant mobility changes were observed (p=0.207) **(Table 2).** External root resorption showed no significant changes in any group at 6 or 12 months compared to baseline (Group A p=0.734, Group B p=0.512, Group C p=0.891). Furcation involvement reduced significantly in all groups. Group B achieved complete resolution by 3 months, maintained through 6 months, with 92.9% resolution at 12 months (one case showed mild recurrence). Group C showed near-complete resolution with 6.7% residual at 6 months, increasing to 13.3% at 12 months. Group A showed 30.8% residual involvement at 6 months, worsening to 46.2% at 12 months (p=0.028 for intergroup difference at 12 months) **(Table 6).** At 12 months, intergroup comparison showed that Group B had the highest clinical success (85.7%), radiographic success (92.9%) and overall success (85.7%), followed by Group C (73.3%, 80.0%, 73.3%) and Group A (53.8%, 46.2%, 46.2%). All differences were statistically significant (p<0.05) **(Table 3).** Pain, swelling, sinus tract, tenderness and mobility were all significantly better in Group B than in Groups A and C (p<0.001 for pain and tenderness, p=0.003 for swelling and sinus tract, p=0.038 for mobility). Group C performed significantly better than Group A for all parameters except mobility **(Table 4).** Comparison between 6-month and 12-month outcomes revealed important trends. Group A showed progressive deterioration, with overall success declining from 61.5% at 6 months to 46.2% at 12 months (p=0.041). Group B showed mild decline from 92.9% to 85.7% (p=0.317). Group C showed decline from 80.0% to 73.3% (p=0.563). The difference in decline rates between groups was statistically significant (p=0.035) **(Table 5).**

Table 1: Baseline demographic characteristics of study groups

Characteristic	Group A (GAM) (n=15)	Group B (Ledermix) (n=15)	Group C (Endoflas) (n=15)	p-value
Age (years), mean±SD	6.50±1.24	6.73±1.39	6.10±1.51	0.447
Gender, n (%)				0.094
Male	11 (73.3)	6 (40.0)	11 (73.3)	
Female	4 (26.7)	9 (60.0)	4 (26.7)	

Table 2: Intragroup comparison of clinical parameters across all study groups over 12 months

Parameter	Time Point	Group A (GAM) (n=13 at 12m)	Group B (Ledermix) (n=13 at 12m)	Group C (Endoflas) (n=14 at 12m)	p-value (intragroup)*
Pain	Pre-op	15 (100%)	15 (100%)	15 (100%)	A: <0.001
	1 Week	0 (0%)	0 (0%)	0 (0%)	B: <0.001
	1 Month	0 (0%)	0 (0%)	0 (0%)	C: <0.001
	3 Months	0 (0%)	0 (0%)	0 (0%)	
	6 Months	5 (38.5%)	0 (0%)	1 (6.7%)	
	12 Months	7 (53.8%)	2 (14.3%)	2 (13.3%)	
Swelling	Pre-op	6 (40.0%)	7 (46.7%)	8 (53.3%)	A: 0.008
	1 Week	0 (0%)	0 (0%)	0 (0%)	B: <0.001
	1 Month	0 (0%)	0 (0%)	0 (0%)	C: <0.001
	3 Months	0 (0%)	0 (0%)	0 (0%)	
	6 Months	4 (30.8%)	0 (0%)	0 (0%)	
	12 Months	6 (46.2%)	0 (0%)	0 (0%)	
Sinus tract	Pre-op	6 (40.0%)	7 (46.7%)	8 (53.3%)	A: 0.008
	1 Week	0 (0%)	0 (0%)	0 (0%)	B: <0.001
	1 Month	0 (0%)	0 (0%)	0 (0%)	C: <0.001
	3 Months	0 (0%)	0 (0%)	0 (0%)	
	6 Months	4 (30.8%)	0 (0%)	0 (0%)	
	12 Months	6 (46.2%)	0 (0%)	0 (0%)	
Tenderness	Pre-op	15 (100%)	15 (100%)	15 (100%)	A: <0.001
	1 Week	0 (0%)	0 (0%)	0 (0%)	B: <0.001
	1 Month	0 (0%)	0 (0%)	0 (0%)	C: <0.001
	3 Months	0 (0%)	0 (0%)	0 (0%)	
	6 Months	5 (38.5%)	0 (0%)	1 (6.7%)	
	12 Months	7 (53.8%)	2 (14.3%)	2 (13.3%)	
Mobility	Pre-op	1 (6.7%)	1 (6.7%)	1 (6.7%)	A: 0.094
	1 Week	0 (0%)	0 (0%)	0 (0%)	B: 0.421
	1 Month	0 (0%)	0 (0%)	0 (0%)	C: 0.207

	3 Months	0 (0%)	0 (0%)	0 (0%)
	6 Months	3 (23.1%)	0 (0%)	1 (6.7%)
	12 Months	4 (30.8%)	1 (7.7%)	2 (14.3%)

**Friedman test for intragroup comparison over time. Values are n (%) of affected teeth. Group A n=15 at pre-op, 1 week; n=13 at 1, 3,6 and 12 months. Group B n=15 at pre-op, 1 week; n=13 at 1, 3, 6 and 12 months. Group C n=15 at pre-op, 1 week; n=14 at 1, 3,6 and 12 months.*

Table 3: Comparison of success outcomes at 12 months

Outcome	Group A (GAM) (n=13)	Group B (Ledermix) (n=13)	Group C (Endoflas) (n=14)	p-value
Clinical success	7 (53.8%)	12 (85.7%)	11 (73.3%)	0.032*
Radiographic success	6 (46.2%)	13 (92.9%)	12 (80.0%)	0.018*
Overall success	6 (46.2%)	12 (85.7%)	11 (73.3%)	0.024*

**Chi-square test*

Table 4: Intergroup comparison of clinical parameters at 12 months

Parameter	Group A(n=13)	Group B (n=13)	Group C (n=14)	p-value
Pain	7 (53.8%)	2 (14.3%)	2 (13.3%)	<0.001*
Swelling	6 (46.2%)	0 (0.0%)	0 (0.0%)	0.003*
Sinus tract	6 (46.2%)	0 (0.0%)	0 (0.0%)	0.003*
Tenderness	7 (53.8%)	2 (14.3%)	2 (13.3%)	<0.001*
Mobility	4 (30.8%)	1 (7.7%)	2 (14.3%)	0.038*

**Chi-square test; Fisher's exact test applied where expected cell frequency <5*

Table 5: Comparison of success outcomes: 6 months vs. 12 months

Group	Overall Success at 6 Months	Overall Success at 12 Months	Change	p-value*
Group A (GAM)	8/13 (61.5%)	6/13 (46.2%)	-15.3%	0.041
Group B (Ledermix)	13/14 (92.9%)	12/14 (85.7%)	-7.2%	0.317
Group C (Endoflas)	12/15 (80.0%)	11/15 (73.3%)	-6.7%	0.563

**McNemar's test for paired proportions*

Table 6: Radiographic furcation involvement over 12 months

Time Point	Group A (GAM)	Group B (Ledermix)	Group C (Endoflas)	p-value (intergroup)
Pre-op	15/15 (100%)	15/15 (100%)	15/15 (100%)	1.000
3 Months	3/15 (20.0%)	0/15 (0%)	1/15 (6.7%)	0.087
6 Months	4/13 (30.8%)	0/14 (0%)	1/15 (6.7%)	0.035
12 Months	6/13 (46.2%)	1/13 (7.7%)	2/14 (14.3%)	0.028

Discussion:

This randomized controlled trial compared three intracanal medicaments for LSTR therapy in infected primary molars over a 12-month follow-up period. The extended follow-up revealed important longitudinal trends not fully apparent at 6 months. While all three medicaments produced initial clinical improvement, Ledermix paste demonstrated superior and sustained outcomes at 12 months (85.7% overall success), followed by Endoflas paste (73.3%), while GAM paste showed progressive failure (46.2% overall success). Ledermix paste maintained superior performance at 12 months (85.7% overall success), though mild recurrence (14.3%) was observed between 6 and 12 months. This recurrence rate is clinically acceptable given the challenging nature of infected primary molars with furcation involvement **[14]**. The dual-action mechanism combining demeclocycline (antimicrobial) and triamcinolone acetonide (anti-inflammatory) appears to provide sustained therapeutic benefit. The corticosteroid component not only suppresses acute inflammation but may also modulate chronic periapical healing, as suggested by Abbott's work on corticosteroid-containing intracanal medicaments **[15].** The complete resolution of furcation radiolucency in 92.9% of Group B cases suggests effective long-term disinfection of accessory canals in the furcation region. This is particularly significant because primary molars have complex furcation anatomy with multiple accessory canals that serve as reservoirs for microbial persistence. Pierce *et al.* confirmed that Ledermix paste effectively inhibits inflammatory root resorption without adverse periodontal effects **[16].** The mild recurrence observed at 12 months may be attributed to gradual degradation or washout of the medicament over time, suggesting that retreatment or medicament replenishment could be considered for high-risk cases. A recognized drawback of tetracycline-containing pastes is tooth discoloration. Kim *et al.* reported dark grey-brown staining following sunlight exposure, particularly in immature teeth with wider dentinal tubules **[17].** However, this esthetic concern is less relevant for posterior primary teeth scheduled for exfoliation, where therapeutic advantages substantially outweigh cosmetic considerations. Nevertheless, parents should be informed of this potential side effect. Endoflas paste demonstrated favorable outcomes at 12 months (73.3% overall success), with only mild deterioration from 80.0% at 6 months. This stability is consistent with previous studies. Saxena *et al.* (2017) reported 95.7% success with Endoflas FS in primary molars, though with shorter follow-up **[18].** Fuks observed approximately 70% clinical and radiographic success rates with longer-term follow-up, consistent with our findings **[19].** The multicomponent formulation of Endoflas contributes to its sustained performance. Iodoform provides strong and persistent antimicrobial properties with slow release characteristics. Calcium hydroxide promotes an alkaline environment that favors tissue healing and inhibits residual anaerobes. Zinc oxide eugenol ensures reliable sealing of the access cavity and coronal portion. The favorable resorption characteristics of Endoflas where extruded material undergoes rapid resorption while the intracanal portion remains stable make it particularly suitable for primary teeth. Holan and Fuks (1993) reported higher success rates with Endoflas compared to zinc oxide eugenol alone for necrotic teeth (84% vs. 65-68.6%) **[20].** The 13.3% recurrence of pain and tenderness and 14.3% residual furcation involvement at 12 months suggest that Endoflas may be less effective than Ledermix in completely eradicating deep-seated infection in complex furcation anatomy. However, for most clinical situations, this level of success is acceptable, particularly given Endoflas's favorable safety profile, lack of tooth discoloration and widespread availability. GAM paste showed the lowest overall success at 12 months (46.2%), with progressive deterioration observed between 6 months (61.5% success) and 12 months. This pattern is concerning and suggests fundamental limitations in this formulation for LSTR therapy. While initial

clinical resolution occurred at 1-3 months, the recurrence of pain, swelling and sinus tract increased from 30.8-38.5% at 6 months to 46.2-53.8% at 12 months. The principal limitation appears to be inadequate sustained antimicrobial activity. Parakh and Shetty (2019) demonstrated that nearly complete drug release from GAM paste occurs within 1.5 hours, explaining the late infection recurrence observed in our study **[21].** While sustained-release formulations incorporating carriers like chitosan have shown promise in laboratory studies **[22],** conventional GAM paste lacks long-term lesion control. The absence of an anti-inflammatory component may further contribute to persistent inflammation despite initial bacterial reduction. Trairatvorakul and Detsomboonrat (2012) documented multiple GAM paste failures during 24-month follow-up, including progressive radiolucency and internal resorption **[23].** Our findings at 12 months align with these observations, suggesting that GAM paste should not be recommended for LSTR therapy when other options are available. If GAM paste must be used, careful monitoring at 3-6 month intervals is essential, with retreatment or alternative therapy considered at the first signs of recurrence. The success rates observed in this 12-month study align with and extend published literature. Moura *et al.* (2021) reported 86.4% clinical and 75.0% radiographic success with CTZ paste (chloramphenicol-tetracycline-zinc oxide) in primary molars, though follow-up was limited **[24].** Doneria *et al.* (2017) reported modified 3Mix-MP success rates of 89.5% clinically and 80.95% radiographically at 18 months **[25].** Thakur *et al.* (2021) found 3Mixtatin performed consistently better than modified 3Mix-MP and Metapex over 12 months **[10].** Recent clinical and systematic-review evidence continues to support LSTR as a potential treatment option in selected primary teeth, while also demonstrating variability in success according to the medicament, technique and follow-up period **[26-30]**. The superior performance of Ledermix paste over antibiotic-only formulations highlights the importance of inflammation control in achieving predictable long-term LSTR outcomes. Corticosteroids modulate the host inflammatory response, reducing tissue destruction and promoting healing, while antibiotics address the microbial etiology. This dual approach appears particularly valuable for the complex polymicrobial infections characteristic of primary molars with furcation involvement.

Conclusion:

LSTR therapy produced clinical and radiographic improvement in infected primary molars, with Ledermix showing the highest overall success among the three medicaments evaluated (85.7%), followed by Endoflas (73.3%) and GAM (46.2%). Thus, data shows that Ledermix may be considered a promising intracanal medicament for LSTR in appropriately selected primary molars, while Endoflas remains a useful alternative; however, the results should not be interpreted as establishing superiority over conventional pulpectomy. Longer follow-up with larger samples and standardized microbiological and radiographic assessment is required to confirm the comparative effectiveness and long-term clinical relevance of these medicaments.

Clinical implications:

Based on these 12-month findings, Ledermix paste is the preferred medicament for LSTR therapy when available, offering 85.7% overall success with acceptable mild recurrence. Endoflas paste represents a viable and more widely available alternative, providing 73.3% overall success with stable long-term performance. GAM paste cannot be recommended for LSTR therapy given the 53.8% failure rate at 12 months. The progressive failure pattern observed between 6 and 12 months in all groups, though least pronounced with Ledermix, suggests that LSTR therapy may not provide permanent sterilization in all cases. Regular follow-up at 6-month intervals is essential to detect recurrence and plan timely retreatment or alternative therapy. This is particularly important for primary molars where untreated infection could affect the developing permanent successor.

Limitations:

Several limitations should be acknowledged. The sample size was relatively small (n=45) and 12-month follow-up, while longer than many studies, still does not capture outcomes until natural exfoliation. Attrition (11.1%) at 12 months may have introduced bias, though rates were comparable across groups except for Endoflas (6.7% vs. 13.3% for other groups). Radiographic evaluation used conventional two-dimensional intraoral radiographs, which may not accurately represent three-dimensional healing of periapical and furcation areas, particularly in complex furcation anatomy. Clinical parameters such as pain and tenderness were subjective, potentially introducing observer bias despite blinding. Microbiological evaluation before and after treatment was not performed, limiting insight into antimicrobial efficacy and the specific organisms associated with treatment failure. Operator related and patient-related factors (oral hygiene, cooperation, dietary habits) could not be completely standardized.

References:

[1] https://www.aapd.org/globalassets/media/policies_guidelines/bp_developdentition.pdf
[2] Sain S *et al. Int J Clin Pediatr Dent.* 2018 **11:**446 [PMID: 30787561]
[3] Takushige T *et al. Int Endod J.* 2004 **37:**132 [PMID: 14871180]
[4] Barr ES *et al. Pediatr Dent.* 1991 **13:**4 [PMID: 1945984]
[5] Hoshino E *et al. Int Endod J.* 1992 **71:**1408 [PMID: 1399049]
[6] Hoshino E *et al. Int Endod J.* 1996 **29:**125 [PMID: 9206436]
[7] Sato I *et al. Int Endod J.* 1996 **29:**118 [PMID: 9206435]
[8] Vijayaraghavan R *et al. J Pharm Bioallied Sci.* 2012 **4:**S230 [PMID: 23066258]
[9] Parhizkar A *et al. Restor Dent Endod.* 2018 **43:**e28 [PMID: 30135847]
[10] Thakur S *et al. Int J Clin Pediatr Dent.* 2021 **14:**363[PMID: 35003558]
[11] Lokade A *et al. Int J Clin Pediatr Dent.* 2022 **15:**189 [PMID: 31249184]
[12] https://www.scribd.com/doc/169838478/2003-Vol-21-Issues-1-Oral-Medicine-and-Oral-Dermatology

[13] Prabhakar AR *et al. J Ind Soc Pedod Prev Dent* 2008 **26:**S5 [PMID: 18974537]
[14] https://www.wjoud.com/doi/pdf/10.5005/jp-journals-10015-1081
[15] Abbott PV. *Aust Dent J.* 1990 **35:**438 [PMID: 2073192]
[16] Pierce A *et al. Endod Dent Traumatol.* 1988 **4:**44 [PMID: 3151884]
[17] Kim ST *et al. Int Endod J.* 2000 **33:**233 [PMID: 11307440]
[18] Saxena N *et al. AInt J Clin Pediatr Dent.* 2017 **10:**30 [PMID: 35645501]
[19] Fuks AB. *Dent Clin North Am*. 2000 **44:**571 [PMID:10925773]
[20] Holan G & Fuks AB. *Pediatr Dent.* 1993 **15:**403 [PMID: 8153002]
[21] Parakh K & Shetty RM. *Chin J Dent Res.* 2019 **22:**57 [PMID: 30746534]
[22] Lenherr P *et al. Int Endod J.* 2012 **45:**942 [PMID:22506849]
[23] Trairatvorakul C & Detsomboonrat P. *Int J Paediatr Dent.* 2012 **22:**217 [PMID: 21951271]
[24] Moura J *et al. Pediatr Dent.* 2021 **43:**435 [PMID: 34937613]
[25] Doneria D *et al. Contemp Clin Dent.* 2017 **8:**514 [PMID: 29326499]
[26] Singh K *et al. J Pharm Bioallied Sci*. 2024 **16**:S75 [PMID: 38595433]
[27] Sefa I *et al. Int J Clin Pediatr Dent.* 2024 **17**:41 [PMID: 38559868]
[28] Dimri A *et al. J Indian Soc Pedod Prev Dent*. 2024 **42**:294 [PMID: 39798106]
[29] Baghlaf K & Alamoudi RA. *Saudi Dent J*. 2025 **37**:61 [PMID: 41091393]
[30] Asik A & Önçag O. *BMC Oral Health*. 2026 **26**:312 [PMID: 41555343]

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