



## "Revolutionizing Pediatric Dental Care: The Promise Of PRP And PRF"

**Dr. Noopur Kaushik<sup>1\*</sup>, Dr. Nikhil Srivastava<sup>2</sup>, Dr. Vivek Rana<sup>3</sup>, Dr. Shruti Jha<sup>4</sup>, Dr. Tushar Pruthi<sup>5</sup>,  
Dr. Navpreet Kaur<sup>6</sup>**

<sup>1\*</sup>Professor, Dept. of Pediatric and Preventive Dentistry, Subharti Dental College and Hospital, Swami Vivekanand Subharti University, Meerut. Email:- drnoopurkaushik@gmail.com

<sup>2</sup>Principal, Professor and Head, Dept. of Pediatric and Preventive Dentistry Subharti Dental College and Hospital, Swami Vivekanand Subharti University, Meerut.

<sup>3</sup>Professor, Dept. of Pediatric and Preventive Dentistry, Subharti Dental College and Hospital, Swami Vivekanand Subharti University, Meerut.

<sup>4</sup>Assistant Professor, Dept. of Pediatric and Preventive Dentistry, Subharti Dental College and Hospital, Swami Vivekanand Subharti University, Meerut.

<sup>5</sup>Associate Professor, Dept. of Pediatric and Preventive Dentistry Subharti Dental College and Hospital, Swami Vivekanand Subharti University, Meerut.

<sup>6</sup>Assistant Professor, Dept. of Pediatric and Preventive Dentistry, Subharti Dental College and Hospital, Swami Vivekanand Subharti University, Meerut.

**\*Corresponding Author: Dr. Noopur Kaushik**

**\*Address: Room no. 3, Subharti Dental College and Hospital, Swami Vivekanand Subharti University, Meerut. Email: drnoopurkaushik@gmail.com**

### REVIEW ARTICLE

#### "Revolutionizing Pediatric Dental Care: The Promise of PRP and PRF"

The advancement of bioactive surgical adjuncts, designed to modulate inflammation and accelerate the healing process, stands as a significant challenge in the realm of clinical research.<sup>1</sup> Healing, as a complex process, encompasses cellular organization, chemical signaling, and the extracellular matrix crucial for tissue repair.<sup>2</sup> While the comprehension of the healing process remains incomplete, it's widely acknowledged that platelets play a pivotal role in both hemostasis and wound healing mechanisms.<sup>3</sup>

In the realm of modern dentistry, innovative techniques and advancements continually redefine treatment approaches, aiming for more efficient healing and better patient outcomes. Platelet-Rich Plasma (PRP) and Platelet-Rich Fibrin (PRF) have revolutionized various fields of medicine, including dentistry, by offering innovative solutions for tissue regeneration and wound healing. Moreover, the incorporation of Titanium-rich PRF has further elevated their significance in dentistry.

#### Understanding Platelet-Rich Plasma (PRP) and Platelet-Rich Fibrin (PRF)

**PRP:** Platelet-Rich Plasma involves a concentration of platelets derived from the patient's own blood. Through a centrifugation process, the blood is separated into its components, yielding a plasma with a higher concentration of platelets than usual. These platelets are rich in growth factors and cytokines, pivotal for tissue regeneration and wound healing. Whitman et al. were pioneers in 1997, introducing the application of platelet-rich plasma (PRP) in oral surgical procedures. They highlighted its significant advantages due to its ability to enhance osteoprogenitor cells in the host bone and bone graft. Nevertheless, the utilization of PRP also carries potential risks, notably associated with the use of bovine thrombin for PRP handling. This may lead to the generation of antibodies targeting factors V, XI, and thrombin, potentially resulting in coagulopathies that pose life-threatening risks.<sup>4</sup>

**PRF:** In 2001, Choukroun et al. pioneered the application of Platelet-Rich Fibrin (PRF), specifically within oral and maxillofacial surgery. Platelet-Rich Fibrin is an advanced form of platelet concentrate, distinguished by a fibrin matrix that encapsulates platelets and leukocytes. This three-dimensional fibrin clot enhances the sustained release of growth factors, facilitating a more prolonged healing process compared to PRP. It offers distinct advantages over PRP, notably simpler preparation methods and independence from chemical manipulation of blood, making it an entirely autologous preparation.<sup>4,1</sup>

### **Role of Titanium-Rich PRF in Dentistry**

The integration of Titanium into PRF solutions has significantly enhanced their efficacy and suitability for dental applications. Titanium acts as a catalyst, accelerating the activation of platelets and consequently augmenting the release of growth factors.<sup>5</sup>

#### **Advantages of Titanium-Rich PRF in Dentistry**

1. **Improved Osseointegration:** Titanium-rich PRF has shown promising results in enhancing the osseointegration process, critical for dental implants. The accelerated healing and tissue regeneration facilitated by growth factors promote better fusion between the implant and the surrounding bone.
2. **Faster Wound Healing:** Dental surgeries often involve soft tissue manipulation and bone grafting. Titanium-rich PRF expedites the healing of these tissues, reducing post-operative discomfort and expediting the recovery period for patients.
3. **Reduced Risk of Infection:** The antimicrobial properties of Titanium contribute to reducing the risk of infections following dental procedures when incorporated into PRF solutions.<sup>6</sup>

### **Applications in Pediatric Dentistry:**

**Faster Healing Post-Extractions:** Children often require tooth extractions due to various reasons, including decay or orthodontic treatment. PRP/PRF usage post-extractions aids in quicker healing, minimizes bleeding, and reduces discomfort, ensuring a more comfortable recovery for young patients.<sup>7</sup>

**Management of Traumatic Dental Injuries:** Children are prone to dental injuries while playing or engaging in physical activities. PRP/PRF applications in managing traumatic dental injuries aid in promoting tissue regeneration, reducing inflammation, and enhancing the healing process. Mittal et al. conducted an assessment comparing the regenerative potential of PRF alongside artificial scaffolds in the context of incomplete root development in permanent teeth. Their findings indicated that PRF and collagen scaffolds outperformed chitosan and placentrex in facilitating apexogenesis, demonstrating superior regenerative abilities for this purpose.<sup>8</sup>

**Assistance in Pulp Therapy:** Bacteria play the primary role in the development of necrotic pulps, periapical pathosis and post-treatment disease following root canal treatment.<sup>9</sup> For pediatric patients undergoing pulp therapy or root canal treatments, the application of PRP/PRF can aid in faster healing, reducing the need for multiple visits and ensuring better long-term outcomes. Mostafa AA conducted pulpotomy procedures utilizing PRF, revealing a clinical success rate of 89.5% and a radiographic success rate of 78.9%. from this study, it is concluded that PRF presents a viable alternative to FC as a pulpotomy agent.<sup>10</sup>

**Support in Orthodontic Procedures:** In orthodontic treatments, PRP/PRF can assist in faster recovery post-surgeries or in accelerating the healing process after the placement of orthodontic appliances.<sup>7</sup>

### **Limitation of PRF in Pediatric Dentistry**

1. PRF is not suitable for filling large defects in cyst cases due to its limitations. Because PRF is derived from an autologous blood sample, the quantities produced are relatively low, restricting its application in larger defect fillings.
2. Utilizing allogeneic graft tissue becomes impractical due to the high specificity of PRF membranes to the individual donor.
3. Maintaining the integrity of PRF proves challenging as preservation leads to shrinkage caused by dehydration, altering its structural integrity and diminishing the content of growth factors within the PRF.<sup>7</sup>

#### **Advantages in Pediatric Dentistry:**

1. **Reduced Discomfort:** PRP/PRF techniques minimize post-operative discomfort, making the dental experience less daunting for children.

2. **Accelerated Healing:** These blood concentrates promote faster tissue repair, reducing recovery times and allowing children to resume normal activities sooner.
3. **Natural and Safe:** As PRP/PRF utilize the patient's own blood, they pose minimal risk of adverse reactions or infections, making them safe for pediatric use.<sup>7</sup>

### Disadvantages of PRF

1. The quantity obtainable is limited due to the use of autologous blood.
2. Immediate processing of blood is essential right after collection.
3. The primary challenge in this procedure is obtaining blood from pediatric patients, given that children often exhibit apprehension or fear towards needles.<sup>7</sup>

The utilization of PRP/PRF in pediatric dentistry goes beyond clinical benefits. It also contributes to improving the overall patient experience. By reducing discomfort, minimizing recovery times, and promoting quicker healing, these techniques foster a positive perception of dental visits among children and their parents, encouraging better compliance with dental treatments.

The potential of PRP/PRF in pediatric dentistry continues to expand. Ongoing research explores further applications, optimized protocols, and potential combination therapies to enhance their efficacy in addressing a wide array of pediatric dental conditions.

### Conclusion:

The integration of PRP and PRF in pediatric dentistry represents a significant advancement in improving dental care for children. These techniques offer a promising avenue to mitigate discomfort, expedite healing, and enhance the overall dental experience, ensuring better oral health outcomes for the younger population.

### References

1. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, Gogly B. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part I: technological concepts and evolution. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2006;101:e37–44.
2. Singer AJ, Clark RA. Cutaneous wound healing. *N Engl J Med.* 1999;341:738–746.
3. Gassling VL, Açil Y, Springer IN, Hubert N, Wiltfang J. Platelet-rich plasma and platelet-rich fibrin in human cell culture. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2009;108:48–55
4. Kiran NK, Mukunda KS, Tilak Raj TN. Platelet concentrates: A promising innovation in dentistry. *J Dent Sci Res.* 2011;2:50–61.
5. Mitra DK, Potdar PN, Prithyani SS, Rodrigues SV, Shetty GP, Talati MA. Comparative study using autologous platelet-rich fibrin and titanium prepared platelet-rich fibrin in the treatment of infrabony defects: An in vitro and in vivo study. *Journal of Indian Society of Periodontology.* 2019 Nov;23(6):554.
6. Gummaluri SS, Gurumoorthy K, Kancharla AK, Boyapati R. Evaluating the Predictability and Regenerative Capacity of Novel Platelet Concentrate (PC)-Titanium Platelet Rich Fibrin (T-PRF) in the field of Dentistry- A Narrative Review. *Cumhuriyet Dental Journal.* 2023 Sep 29;26(3):332-9.
7. Gunasekaran S, Sakthivel S, Babu G, Vijayan V. Clinical Application of Platelet-Rich Fibrin in Pediatric Dentistry. *Journal of Health and Allied Sciences NU.* 2021 Oct 24;12(02):186-90.
8. Mittal N, Parashar V. Regenerative evaluation of immature roots using prf and artificial scaffolds in necrotic permanent teeth: a clinical study. *J Contemp Dent Pract* 2019;20(06):720–726.
9. Kaushik N, Rehani U, Agarwal A, Kaushik M, Adlakha V. Antimicrobial Efficacy of Endodontic Irrigants against *Enterococcus Faecalis* and *Escherichia Coli*: An in vitro study. *Int J Clin Pediatr Dent* 2013;6(2):178-182.
10. Jha S, Goel N, Dash BP, Sarangal H, Garg I, Namdev R. An update on newer pulpotomy agents in primary teeth: A literature review. *Journal of Pharmacy & Bioallied Sciences.* 2021 Jun;13(Suppl 1):S57.