

KNOWLEDGE, ATTITUDE AND PRACTICE BASED SURVEY ON THE USE OF PLATELET DERIVATIVES FOR PERIAPICAL SURGERIES AMONG DENTISTS AND SPECIALISTS

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ABSTRACT

Introduction: Periodontal lesions are the inflammatory process in the pulpal tissues resulting from accumulation of dental plaque on the external root surfaces. The treatment for primary endo lesions involves nonsurgical root canal therapy and appropriate restorative care. In these cases, periodontal intervention is not necessary, and outcomes for these teeth are quite predictable. An online survey link formulated in google forms containing 16 questions respective to the study were circulated online. The responses were collected and were statistically analyzed using chi square analysis in SPSS software and the results were depicted in the form of graphs and pie charts. From the study conducted, we may see that the majority of the respondents were aware of what platelet derivatives are and how they can be applied in periapical surgeries. Most of the respondents were very well aware of how the platelet derivatives are obtained. The respondents were also aware of the side effects of prolonged use of platelet derivatives. Majority of the chi square analysis graphs showed $p < 0.05$ which indicates statistical significance.

Keywords: Endodontic surgery, innovative technology, Periapical lesions; Periodontal lesions; Platelet derivatives; Growth factor.

INTRODUCTION

Apical periodontitis is the body's defense response to the threat of microbial invasion from the root canal. Primary members among the members of the host defense mechanism are the polymorphonuclear leukocytes, otherwise known as the neutrophils. The task of the neutrophils is to locate and destroy microbes that intrude into the body anywhere in the body and they represent the hallmark of acute inflammation [1]. Periapical lesions occur as a result of pulpal inflammation and may rarely be seen in the absence of pulpal diseases. They are the most common pathological lesions affecting the alveolar bone [2]. The primary cause of periapical lesions is endodontic infection [3]. PAMPs-triggered immune response induces proinflammatory cytokines and subsequent periapical pathosis, including chronic inflammation and bone destruction. The primary cause of periapical lesions does not overlap with metabolic disorders. The treatment modalities for periapical lesions include non-surgical root canal treatment, periapical surgery, or tooth extraction. If non-surgical treatment is deemed ineffective or difficult, periapical surgery is the treatment of choice. Periapical lesion is an inflammatory process affecting soft and hard tissues surrounding the tooth. The inflammation is associated with the loss of supporting bone, bleeding on probing and suppuration. Necrosis of the pulp found a suitable environment for microorganisms to release toxins into periapical tissue [4].

Periapical surgery is considered to be the last treatment option before the extraction of a tooth. The main objective of periapical surgery is to seal the root canal system, thereby enabling healing by forming a barrier between the irritants within the confines of the affected root and the periapical tissue [5]. The

periapical surgery consists of the surgical extraction of the lesion that is at the end of the tooth root, next to the section of the end of the root (about 3mm). Usually is accompanied by a small preparation of the end of the cut off root and the sealing off it with an amalgam or special cement. Diseases of the pulp and periapical tissues should routinely be treated by conventional root canal therapy [6]. Surgical intervention is an alternative when the nonsurgical approach is not feasible and a supplement when it has failed [7]. Endodontic treatment attempts to eliminate bacterial infection in the radicular duct. Despite a correct endodontic treatment or retreatment, in some cases periapical pathology persists. Therefore, periapical surgery may be indicated considering that is the last therapeutic option previous tooth extraction [7,8].

Platelet derivatives are valid FBS substitutes due to their content of growth factors that can be released disrupting the platelets by physical methods or physiological stimuli. Platelet-rich plasma (PRP) therapy uses injections of a concentration of a patient's own platelets to accelerate the healing of injured tendons, ligaments, muscles and joints [9]. However, it is your body's healing capabilities that determine the time duration of the outcome. You can prolong the effectiveness of the treatment by taking good care of your body. Platelet-derived factors have been extensively used for clinical and surgical applications requiring tissue regeneration. The rationale for the widespread use of platelet derivatives in the healing process is due to the abundance and accessibility of critical growth factors and other signaling molecules in platelets [10]. Tissue repair is a term that refers to those dynamic processes that normally occur in the body as a physiological response to tissue damage, aiming to restore the normal function and architecture of the damaged area [11]. The study was conducted to create awareness among dentists in the application of platelet derivatives in periapical surgeries.

Our team has extensive knowledge and research experience that has translated into high quality publications [12–21], [22–25]), ([26–30], [31]. The objective of this study was to assess the knowledge, attitude and practice of the use of platelet derivatives for periapical surgery among dentists and specialists through a survey.

MATERIALS AND METHODS

A cross sectional survey based analysis was conducted among dentists online. The survey population included 100 participants. A self structured questionnaire containing 15 questions including the demographic data were circulated online through a google forms link. The questions were close ended and validation was done by the members of the institution. The collected responses were statistically analysed in SPSS software. Chi square analysis was performed correlating different factors. The p values were obtained for each of the graphs and its statistical significance or insignificance was analysed. The p value was set at 0.05. The analysed results were depicted in the form of pie charts and graphs.

RESULTS AND DISCUSSION

Table 1: Showing the percentage distribution.

| Sl.No | Question | Options | Response Percentage |
|-------|-----------------------------------|--------------|---------------------|
| 1. | Year of study | UG | 61.82% |
| | | PG | 20% |
| | | Practitioner | 18.18% |
| 2. | Awareness on platelet derivatives | Yes | 85.45% |
| | | No | 14.55% |

| | | | |
|-----|--|--|------------------------------------|
| 3. | Awareness on how platelet derivatives are obtained | Blood centrifugation Plasma processing Not aware | 73.54% 13.64% 12.73% |
| 4. | Example of platelet derivatives | PRP PRF Platelet eye drops All the above | 14.55% 5.45% 3.64% 76.36% |
| 5. | Effectiveness of platelet derivative on periapical surgery | Releases growth factors and proteins Accelerates bone healing Both | 17.27% 7.27% 75.45% |
| 6. | Indications for periapical surgery | Gingival recession Scarring Tissue discolouration All the above | 16.36% 4.55% 4.55% 74.55% |
| 7. | Knowledge about the treatment of periapical surgery | Apical periodontitis Gingivitis Ulcerative stomatitis | 71.82% 20.00% 8.18% |
| 8. | Knowledge about the increase in radioactive density on treatment with PRP | Yes No | 87.27% 12.73% |
| 9. | Knowledge about increase with mitosis on treatment with platelet derivatives | Yes No | 74.45% 24.55% |
| 10. | Knowledge about the platelet derivatives reducing the need for stiptics | Yes No | 73.62% 26.36% |

| | | | |
|-----|---|-----|--------|
| 11. | Knowledge about reduction in inflammation on treatment with PRP | Yes | 87.27% |
| | | No | 12.73% |
| 12. | Knowledge regarding decrease in probing depth on prolonged use of platelet derivative | Yes | 82.73% |
| | | No | 17.27% |
| 13. | Knowledge on faster formation on haemostatic plug on usage of platelet derivative | Yes | 86.36% |
| | | No | 13.64 |
| 14. | Knowledge about the lifespan of platelet derivative | Yes | 42.73% |
| | | No | 57.27% |

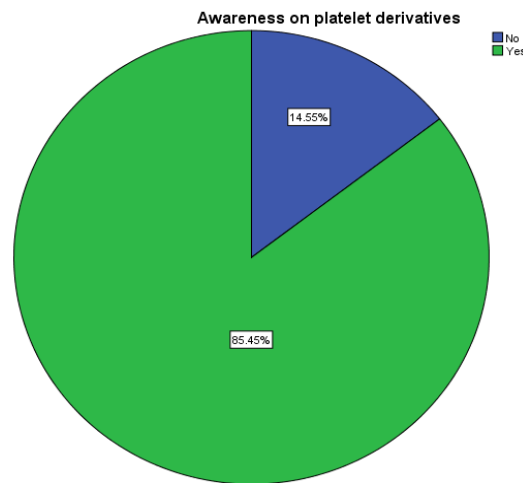


Figure 1: Pie chart representing the awareness about platelet derivatives among participants. 85.45% of the respondents were aware (green) and 14.55% of the respondents were unaware (blue).

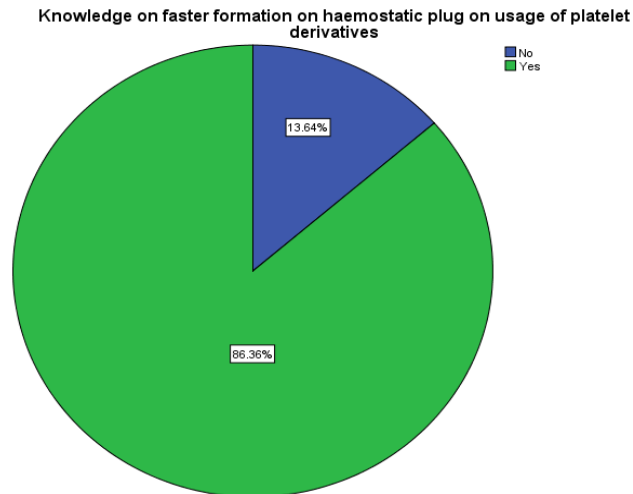


Figure 2: Pie chart representing the knowledge about faster formation of hemostatic plug on usage of platelet derivatives. 86.36% of the respondents were aware (green), 13.64% of the respondents were unaware (blue)

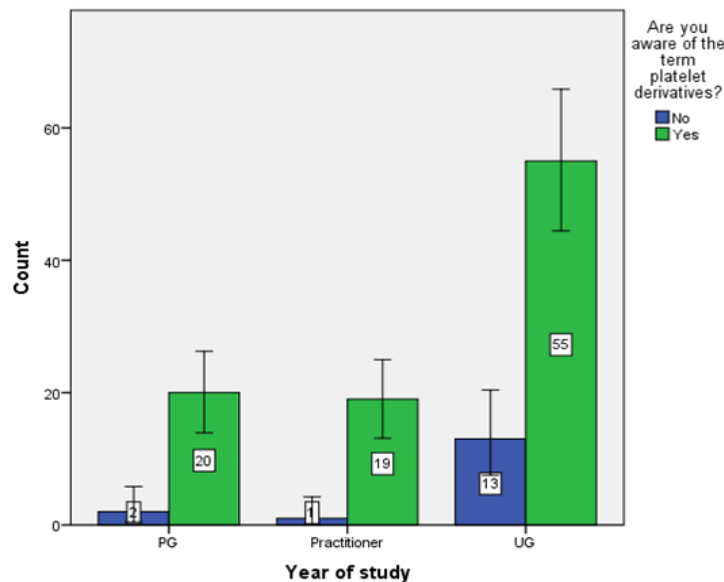


Figure 3: Chi square analysis showing the association between year of study and awareness about platelet derivatives. X axis represents the year of study and Y axis represents the number of participants. Green colour represents the participants who responded yes and blue colour represents the participants who responded no. From this graph it can be interpreted that 55 UG students have responded positively. The association between year of study and awareness about platelet derivatives is statistically not significant association $p = 0.345$. ($p > 0.05$ indicating statistically not significant).

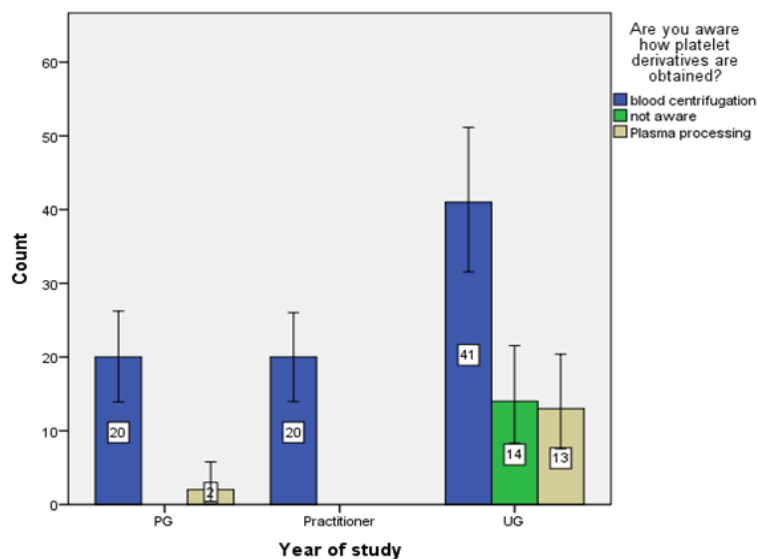


Figure 4: Chi square analysis showing the association between year of study and awareness about how platelet derivatives are obtained. X axis represents the year of study and Y axis represents the number of participants. Green colour represents the participants who were not aware, blue colour represents the participants who chose blood centrifugation, and yellow colour represents the participants who said plasma processing. From this graph it can be interpreted that 41 UG students say blood centrifugation is the source of platelet derivatives. The association between year of study and awareness about how platelet derivatives are obtained is a statistically significant association $p = 0.002$. ($p < 0.05$ indicating statistically significant).

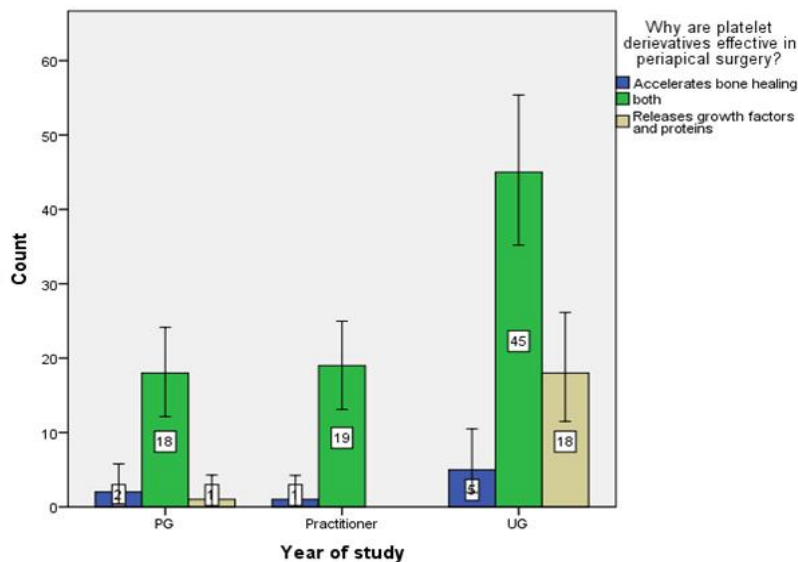


Figure 5: Chi square analysis showing the association between year of study and awareness about how platelet derivatives are effective in periapical apical surgeries. X axis represents the year of study and Y axis represents the number of participants. Blue colour represents the participants who chose accelerated bone healing, yellow colour represents the participants who chose release of growth factors and proteins and Green colour represents the participants who opted for both the reasons. From this graph it can be interpreted that 45 UG students have responded to both the stated options. The association between year of study and awareness about how platelet derivatives are effective in periapical surgeries is a statistically significant association $p = 0.03$. ($p < 0.05$ indicating statistically significant).

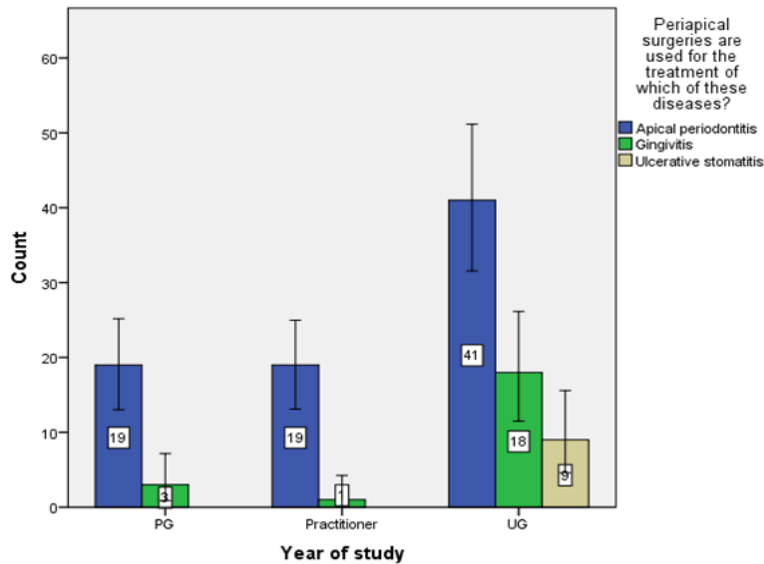


Figure 6: Chi square analysis showing the association between year of study and awareness about when periapical apical surgeries are performed. X axis represents the year of study and Y axis represents the number of participants. Green colour represents the participants who opted for gingivitis, blue colour represents the participants who chose apical periodontitis, and yellow colour represents the participants who chose ulcerative stomatitis. From this graph it can be interpreted that 41 UG students have responded to apical periodontitis. The association between year of study and awareness about when periapical surgeries are performed is a statistically significant association $p=0.007$ ($p<0.05$ indicating statistically significant).

Participants who have pursued their undergraduate and postgraduate in dental surgery and also the dental practitioners took part in the survey. 61.8% of the respondents were undergraduates, 20% of the respondents were postgraduates and 18.2% of the respondents were dental practitioners (**Table1**). 85.5% of the respondents were aware of the term platelet derivatives and 14.5% of them were unaware (**Figure 1**). The association between the year of study and awareness about platelet derivatives showed statistical insignificance (**Figure 3**). 73.6% of the respondents were aware that platelet derivatives are obtained by blood centrifugation, 13.6% of the respondents thought it was obtained by plasma processing and 12.7% of the respondents were unaware of how platelet derivatives are obtained (**Table1**). The association between year of study and knowledge about how platelet derivatives are obtained showed statistical significance (**Figure 4**). For preparation of PRF, only centrifuged blood without any addition of anticoagulant and bovine thrombin is required [32].

76.4% of the respondents were aware that PRP, PRF are examples of platelet derivatives, whereas 14.5% of the respondents said only PRPs are examples of platelet derivatives. 5% of the respondents thought platelet eye drops were examples of platelet derivatives and the other 5% thought PRFs are examples of platelet derivatives (**Table1**). Platelet-rich fibrin is a second-generation platelet derivative consisting of membranes of fibrin enriched with platelets and growth factors. This material has gained much popularity in Oral, ENT and plastic surgeries [33]. 16.7% of the respondents say platelet derivatives are effective in periapical surgeries as they release growth factors and proteins, 7.4% of the respondents said it is effective because platelet derivatives accelerate bone healing, and 75.9% of the respondents agreed to both the above stated reasons (**Table1**). The association between year of study and awareness about how platelet derivatives are effective in periapical surgeries showed statistical significance (**Figure 5**). Various in vitro studies have demonstrated that PRP exerts positive effects on gingival fibroblasts, oral osteoblasts, and periodontal ligament, making it an ideal candidate to facilitate complete periodontal regeneration [34].

74.5% of the respondents say gingival recessions, tissue discoloration and scarring are the indications for a periapical surgery. The rest of the population chose any one of the above stated reasons (**Table1**). 71.8% of the respondents were aware that periapical surgeries were performed to treat apical periodontitis, 20% of the respondents said it was performed to treat gingivitis and 8.2% of the respondents said it was performed to treat ulcerative stomatitis (**Table1**). The association between year of study and awareness about when periapical surgeries are performed showed statistical significance (**Figure 6**). 54.5% of the respondents think that platelet derivatives can accelerate tissue regeneration in periapical lesions, 10.9% of the respondents disagreed with the statement and 34.5% of the respondents were not sure (**Table1**).

88.1% of the respondents were aware that treatment with PRP could increase radiographic density and 11.9% of them were unaware (**Table1**). 75.5% of the respondents were aware that platelet derivatives can increase mitosis in the periapical regions, whereas 24.4% of them were unaware (**Table1**).

73.6% of the respondents said that platelet derivatives can reduce the need of styptics, and 26.4% of the respondents disagreed with the statement (**Table1**). 88.1% of the respondents said PRPs can reduce inflammation after periapical procedures, and 11.9% of the respondents disagreed with the statement (**Table1**).

82.7% of the respondents think that platelet derivatives can reduce probing depth on prolonged use, and 17.3% of the respondents disagreed with this statement (**Table1**). 86.4% of the respondents think that the formation of hemostatic plug is faster in relation to platelet derivatives as compared to normal clotting factors. 13.6% of the respondents disagreed with the statement (**Figure 2**). 42.7% of the respondents think platelet derivatives have a shorter life span than the normal platelets, the rest 57.3% of the respondents disagree with the statement (**Table1**). Life is short for platelets, which survive only about ten days before they are removed from the bloodstream. Platelet numbers are thus set by a balance between their production and removal [35].

CONCLUSION

From the above survey conducted we have assessed the knowledge, attitude and practice of the use of platelet derivatives for periapical surgeries among dentists. The surveyed population is very well aware about why platelet derivatives are effective in periapical surgeries. The limitations of this study was the small sample size and response bias. By rectifying the limitations we can further promote the use of platelet derivatives in endodontic surgeries by creating more awareness about them by conducting such surveys and studies. This may lead to the development of new and faster healing procedures in the field of oral surgery.

LIMITATION

The limitation of this study is that the sample size that was taken for the study was less and the parameters which were included were scarce.

FUTURE SCOPE

To overcome the limitation, more sample size should be included and more parameters should be included to generalise the study.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORS CONTRIBUTION

Author 1: Obuli Ganesh Kishore carried out the study by collecting data and drafted the manuscript after performing the necessary statistical analysis and in the preparation of the manuscript.

Author 2: Dr.Adimulapu Hima Sandeep aided in conception of the topic, designing the study and supervision of the study, correction and final approval of the manuscript.

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