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Comparative Evaluation of Clinical Potential ofHuman Platelet Derived Growth Factor Gel Dressing and Conventional Dressing used in Oral Surgical Procedures: An Original Research Study

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ABSTRACT

Aim:The sole aim of this study was to compare and evaluate clinical potential ofhuman platelet derived growth factor gel dressing and conventional dressing used in oral surgical procedures.**Materials and Methods**: This study included total 30 patients including 21 male and 9 female patients. All patients have been explained about the study in detail and informed consent obtained accordingly. All thirty patients have been studied equally into two study groups (of fifteen each) as per their dressing material. In Group one patients, human platelet derived growth factor gel dressing was used for wounds healing. In Group two patients, conventional dressing (povidone iodine) used was used for wounds healing (control group). Patients were recalled in the post healing phase once a week up to three weeks. To quantify the healing response, scoring system was utilized which has zero to ten scores. Results thus obtained was compiled and sent for necessary statistical analysis. P value less than 0.05 was considered significant ($p< 0.05$).**Results:**Statistical evaluation was completed by statistical software Statistical Package for the Social Sciences version 21. Total 13 patients (maximum) were in age range of 24-29years. P value was found to be significant in this age group (0.02). Two sample t- testassessments were attempted. This indicated superior clinical performance of group one dressing material (human platelet derived growth factor gel). Fundamental statistical description with level of significance assessment using pearson chi-square test for group I showed highly significant P value. Comparison among the 2 study groups using one-way ANOVA showedhighly significant p value.

Conclusion:Authors concluded that clinical potential and healing performance ofhuman platelet derived growth factor gel dressing was superior toconventional povidone iodine dressing.

Key words: Human Platelet Derived Growth Factor Gel, Conventional Dressing, Oral Surgery, Wound.

I. INTRODUCTION

Many of the researchers have confirmed that platelet-derived growth factor is aneffective activator for cells of mesenchymal origin. Platelet-derived growth factor usually stimulates many of the cellular and tissue mechanisms including chemotaxis, propagation, novel gene expression in macro and micro-molecular milieu.[1,2,3] Such vital processes are very crucial for normal tissue growth, maintenance and periodic repair. Wound healing process is a series of event that starts immediately after injury or tissue insult. These procedures are broadly seen as cellular propagations and interrelated biochemical actions. Internal hemostasis is an adjunct to these remodeling occurring at tissue bed.[4,5] Many of the pioneer workers have confirmed that any type of wound undergoes such series of

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molecular events. These processes are primarily working towards reestablishment and repair of lost tissues and surrounding structures.[6,7,8] Platelet-derived growth factors are usually considered to augment creation of granulation tissue at the center portion of the wound bed.Literature has well evidenced that curative action of platelet-derived growth factor is noticed maximally in the initial stage.[9,10] However, many other studies have confirmed their prolonged and continued effect of wound healing.[3,5,8,11] Later advanced and molecular studies have demonstrated that platelet-derived growth factor accentuates dna synthesis along with collagen synthesis. Platelet derived growth factor is one of the imperative growth factors that play key role in all steps of wound curing.[12,13,14] In the recent years, platelet derived growth factors have been extensively tried in the intraoral wound healing. The sole idea was based on the rapid recovery with minimum discomfort. The ultimateaim of this study was to compare and evaluate clinical potential ofhuman platelet derived growth factor gel dressing and conventional dressing used in oral surgical procedures.

II. MATERIALS & METHODS

This study was conducted in the department of oral and maxillofacial surgery of the institute. Authors endeavored to see the clinical potential or post healing performance of two different dressings. Study included total 30 patients including 21 male and 9 female patients. Case selection procedures were attempted very carefully since authors planned to select only intraoral minor wound created by trauma or nearby minor surgery. Patients were selected from the routine opd of the department without any discrimination. All patients have been explained about the study in detail and informed consent obtained accordingly. Study design and its methodology were finalized and ethical clearance was obtained for the same. Authors have also followed few strict exclusion criterions to maximize standardization and minimize any procedural bias. These included wound with superadded infections, badly crushed wound with undefined margins, patients with history of recent organ transplant, diabetes, chronic alcoholism, history of smoking, expecting women, history of blood related disorders. Comprehensive case history recorded including detailed medical history and examination of vitals. After initial proceedings, patients were immediately addressed for his chief complaint along with clinical management of oral would. All thirty patients have been assorted equally into two study groups (of fifteen each) as per their dressing material. In Group one patients, human platelet derived growth factor gel dressing was used for wounds healing. In Group two patients, conventional dressing (povidone iodine) used was used for woundshealing (control group). In both the groups, initially the wounds were cleaned effectively to prepare an uncontaminated site. The dressings were placed in the wounds following strict surgical and sterilization protocols. Patients were recalled in the post healing phase once a week up to three weeks. Response related to healing, symptomatic factors, clinical evaluation of healing, clinical assessment of wound margins and history of bleeding/infection/scar has been recorded by two independent observers. To quantify the response, scoring system was utilized which has zero to ten scores. Zero was reserved for hopeless situation while ten was given to the excellent performance. Results thus obtained was compiled and sent for necessary statistical analysis. P value less than 0.05 was considered significant ($p< 0.05$).

III. RESULTS

All the recorded data and related details were entered into excel sheet and sent for statistical evaluation using statistical software Statistical Package for the Social Sciences version 21 (IBM Inc., NY, USA). The important data was subjected to suitable statistical tests to obtain p values, mean, standard deviation, chi- square test, standard error and 95% CI. Table 1 and Graph 1 exhibit that out of 30 patients, males were 21 and females were 9. Total 13 patients (maximum) were in age range of 24-29years. P value was found to be significant in this age group (0.02). 8 patients have beennoticed in second age range of 30-35years. 6 patients were seen in age range of 36-41 years. P value was non significant here. Minimum 3 patients were foundin last age group of 42-47 years. P value was significant here (0.01).Table 2 demonstrates two sample t- test Assessment of mean score and standard deviation in both the study groups. The assessment was attempted at three different post operative recall visits at one week interval. The overall mean score of group one was greater than group two. This indicates superior clinical performance of group one dressing material (human platelet derived growth factor gel). Therefore, inferences of two sample t-test were very crucial. Table 3demonstrated the fundamental statistical description with level of significance assessment using pearson chi-square test for group I. P value was highly significant for scoring done at one week and at three week. Table 4 demonstrated the fundamental statistical description with level of significance assessment using pearson chi-square test for group I. P value was highly significant for scoring done at three week. Table 5 exhibited thecomparison among the 2 study groups using one-way ANOVA. The overall comparison and p value was highly significant.

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Table 1: Age & gender wise distributionof patients

Age Group (Yrs)	Male	Female	Total	P value
24-29	9	4	13[43 %]	0.02*
30-35	6	2	8 [27 %]	0.50
36-41	4	2	6[20 %]	0.08
42-47	2	1	3[10 %]	0.01*
Total	21	9	30 [100 %]	***p<0.05 significant**

Graph 1: Age & gender wise distributionof patients

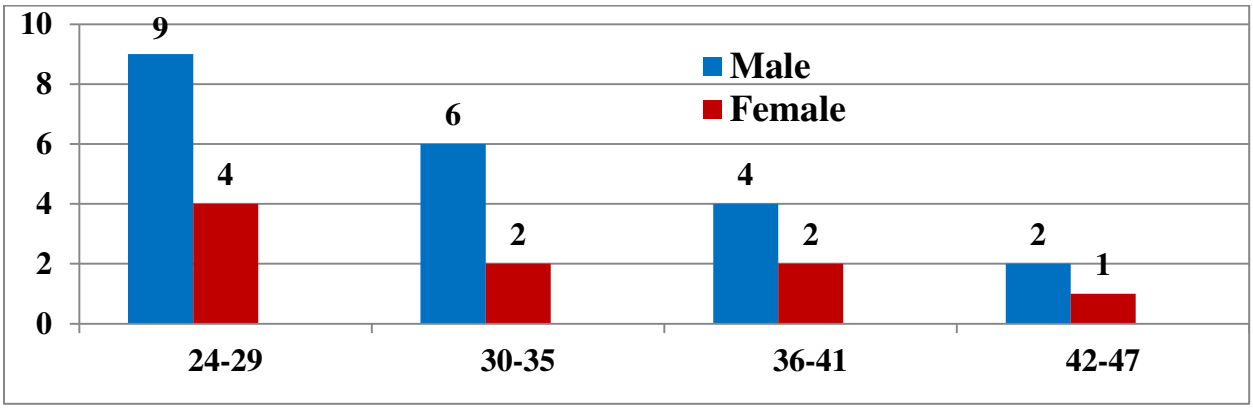

Table 2: Two sample t- test assessment of mean score and standard deviation in both the study groups

Two sample t- test	Group I		Group II	
	Mean Score	SD	Mean Score	SD
After 1 week	6.624	2.68	3.937	1.07
After 2 week	7.215	1.43	5.827	1.85
After 3 week	8.946	1.58	6.013	2.58
P-value	0.005 (Significant)		0.631(Non-Significant)	

Table 3: Fundamental statistical description with level of significance assessment using Pearson chi-square test [group I]

Assessments	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
After 1 week	0.327	2.28	1.231	1.0	0.005*
After 2 week	0.034	1.03	0.324	1.0	0.850
After 3 week	0.434	1.32	1.093	2.0	0.001*

Table 4: Fundamental statistical description with level of significance assessment using Pearson chi-square test [group II]

Assessments	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
After 1 week	0.435	2.12	1.646	1.0	0.090
After 2 week	0.084	1.64	0.948	1.0	0.435
After 3 week	0.326	1.48	1.435	2.0	0.002*

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Table 5: Comparison among the 2 study groups using one-way ANOVA [for group I, II]

Variables	Degree of Freedom	Sum of Squares ∑	Mean Sum of Squares m∑	F	Level of Significance (p)
Between Groups	2	2.049	1.565	4.731	0.001*
Within Groups	23	8.039	0.349	-	
Cumulative	145.43	13.847	-		

IV. DISCUSSION

In the field of curative medicine, many of the adjunctive factors have been experimented over the decades. Most extensively studied and researched are various growth factors. Because of their acceptable results and outcomes, theyhave gained popularity and commercialization for wound healing.[15,16]One of the most prominent and imperative growth factor which play key role in wound healing is platelet-derived growth factors. Originally, platelet-derived growth factors have five different isoforms which trigger cellular response via two different receptors.[17,18,19]Platelet-derived growth factors are chemically dimers of A and B polypeptide chains. These dimersoccasionally unite to two receptor platelet-derived growth factors-Rα and platelet-derived growth factors-Rβ.[20,21,22]Platelet-derived growth factor is a strongmitogenicagentparticularly for connective tissue bed. Platelet-derived growth factor-A is primarily distributed by epithelial cells in the developing lung.Other popular and effective factors include epidermal growth factor (protein that known to augment cell growth and differentiation), fibroblast growth factors (a collaboration of cell signaling proteins created by macrophages), transforming growth factors (polypeptide growth factor which include TGFα and TGFβ) and insulin-like growth factors (a hormone which accelerate normal bone and tissue growth and development with growth hormone).[23,24,25,26]Purushothaman and colleagues have studied the efficiency of platelet-derived growth factors in healing of diabetic ulcer.[27] In their prospective randomized controlled trail they concluded that platelet-derived growth factors application is an successful tactic to assist wound contraction in diabetes patients. Dressing of platelet-derived growth factors was found to be very valuable and secure in promoting wound healing. Their results were in accordance with our outcomes. Sagarika had alsoevaluated the usefulness and clinical outcomes of platelet-derived growth factors gel dressing over the conventional dressing.[28] Authors concluded that platelet-derived growth factors stimulate wound healing faster than routine povidone iodine dressing. Their results were in accordance with our outcomes.

V. CONCLUSION

Within the limitations of the study authors concluded that clinical potential and healing performance ofhuman platelet derived growth factor gel dressing was superior toconventional povidone iodinedressing. Surprisingly, the healing parameters and scorings were found to be increasing from 1 week to 3 week period for both the tested dressings. However, human platelet derived growth factor gel dressing showed nearly excellent results. Since it is promoting wound healing and oral regenerative procedures, it can be utilized safely in indicated situations to obtain optimal results. The outcomes of this study must be considered as suggestive for anticipating clinical resultsof such critical situations. Nonetheless, we expect some other large scale studies to be conducted that could further set certain authentic norms in this prospective.

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