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CLINICAL AND RADIOGRAPHIC EVALUATION OF LEUCOCYTE PLATELETS - RICH FIBRIN IN BONE HEALING AROUND IMMEDIATE DENTAL IMPLANTS

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KEYWORDS

Leucocyte Platelets – Rich Fibrin; Bone Healing; Immediate Dental Implant.

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ABSTRACT

Background: Platelet-rich fibrin (PRF), is a second-generation platelet concentrate; leucocyte- and platelet-rich fibrin (L-PRF) is a modified PRF biomaterial that has been proven to enhance bone healing, therefore, may be used to promote osseointegration around immediate dental implants. **Aim:** To assess the utilization of L-PRF in bone healing around immediate dental implants. **Patients and methods:** Eighteen dental implants were placed in patients with badly decayed bilateral mandibular anterior or premolar teeth indicated for extraction and implant placement utilizing the split-mouth technique. Patients' side was randomly allocated into two groups, (n = 9 implants/ group) where: Group I (control): The control side received immediately placed implants without L-PRF after extraction; Group II (study): The study side received immediately placed implants with L-PRF membranes placed around the osteotomy site immediately after extraction and implant insertion. Clinical assessment of implant stability was performed using the Ostell device where ISQ readings were recorded immediately after implant placement then after 6 months. Pre-operative radiographic assessment was performed via CBCT, then, post-operative follow up was carried out using periapical digital radiographs, immediate post-operative, then after 3 and 6 months; bone density was measured using IDRISI Kilimanjaro software around the implant in the osteointegration zone, which is the implant–bone interface. **Results:** The mean of clinical test (Ostell ISQ readings) was 62.2 (±3.8) and 67.8 (±3.4) at immediate post-operative and 68.3 (±3.6) and 81.4 (±6.17) at 6 months for both control and L-PRF groups; respectively. Upon comparing group I to group II, there was no significant difference was seen immediate post-operative between both groups, however at 6-months, a highly significant difference was observed between both examined groups where the L-PRF group exhibited significantly higher Ostell readings (p= <0.001). The mean of radiographic relative bone density was 132.6 (±15.38) and 150.5 (±13.28) immediate post-operatively, then, density values recorded 121.3 (±14.64) and 141.8 (±17) after 3 months, and 151.7 (±16.68) and 186.5 (±19.03) after 6 months for the control group and the L-PRF group respectively. Results showed statistically significant changes in the control and L-PRF groups throughout follow-ups whereas comparison between both groups showed significantly higher density values in the L-PRF group especially after 6 months. **Conclusion:** Use of Leucocyte-platelet-rich fibrin may show improvement in implant stability and bone healing as well as increased bone density around immediate dental implants.

INTRODUCTION

A dental implant is a device made of one or more materials implanted into the jaws with the intention of biologically bonding with the adjacent tissue [(1)].

The initial dental implants were probably utilized at the end of the 1st century AD to restore missing teeth [2]. Modern implants, on the other hand, did not exist until the 1960s. It was only at that point that Brenemark [3] and his colleagues coined the term "osseointegration", which ever since has been the term used to describe mechanical stability of a successfully placed dental implant.

Microscopically, osseointegration was initially characterized as "a direct structural and functional relation between ordered, living bone and the surface of a load-bearing implant"[4]. On the other hand, osseointegration is defined as a procedure of stiff attachment of an alloplastic substance when asymptomatically preserved in bone through functional loading, according to a more clinical definition [5].

The first commercial implants utilized for tooth replacement have been made of gold, aluminum, silver, porcelain, and platinum [2]. The majority of these products are no longer in use because they triggered a significant foreign body or inflammatory reaction with fibrous tissue formation [1]. Nowadays, titanium is regarded as the gold standard of implant materials due to its mechanical strength and elasticity, as well as its low density, biocompatibility and stability [6].

Sandblasting, etching, chemical or physical vapor deposition, oxidation, spark anodization, laser management, or cold gas spray, between other treatments, may change the physico–chemical actions and microstructural properties of the implant surface, which can influence the bone formation processes[6]. Biomolecular adsorption and cell adhesion to the implant surface, and also osteoblast cell maturation, can be influenced by surface properties [3].

Platelet-rich fibrin (PRF) is regenerative medical technique that utilizes elements derived from a patient's own blood to promote healing and tissue regeneration. Leucocyte Platelet-rich fibrin (L-PRF) is a technique that concentrates platelets, growth factors, leukocytes and proteins into a membrane that helps the healing of soft tissue such as gingiva as well as bone. (L-PRF) represents a novel category of platelet concentrates obtained by simplified processing and the absence of biochemical blood manipulation[7]. Platelets undergo activation through the centrifugation of platelet-rich fibrin, resulting in extensive degranulation that facilitates the release of cytokines [8].

L-PRF is typically produced when a small amount of blood is drawn from a vein (similar to a routine blood draw for lab work) and then spun down in a centrifuge to isolate and concentrate plasma and platelets. These isolated platelets are then placed into a surgical site to promote better healing. Due to the use of the patient's blood there is no risk of rejection or an allergic reaction [9]. Since L-PRF contains high concentration of platelets and leukocytes, growth factors are released for up to 14 days after placement. L-PRF has a multitude of applications such as combining with bone graft to reduce bone loss after an extraction or when placing implants where is a deficiency of bone. L-PRF can also be used for sinus and dental ridge augmentation[7].

The use of autogenous bone mixed with platelet-enriched fibrin glue can achieve results superior to those for grafts of autogenous bone alone in terms of enhanced osseointegration of dental implants and increased height of new bone [10]. L-PRF, unlike the other platelet concentrates, would be able to progressively release cytokines during fibrin matrix remodeling, leading to enhanced healing properties in experimental and clinical situations [8].

Therefore, the key goal of the present investigation was to assess the utilization of leucocyte platelets–rich fibrin in bone healing around immediate dental implants.

PATIENTS AND METHODS

This comparative clinical study has been performed on eighteen dental implants placed in the mandibles of patients with badly decayed unrestorable bilateral anterior or premolar teeth indicated for extraction and dental implant placement. The investigation participates were chosen from those attending the outpatient clinic of the Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Suez Canal University, and was approved by the Research Ethics Committee (REC, 630/2023).

The patients were selected to fulfil the following eligibility criteria:

Inclusion criteria: Medically healthy patients without conditions affecting bone healing, patients with bilateral lower anterior or premolar teeth indicated for extraction, appropriate oral hygiene, no radiographic evidence of bone loss (as indicated by pre-operative radiographs), females ranging in age from 20 to 30 years.

Exclusion criteria: Patients with crestal or vertical bone loss at the proposed implant site, bruxism and smoking cases.

Implant Grouping: The present study utilized the split-mouth technique where each patient's side was randomly allocated into one of the two study groups using research randomizer software: Group I (control group or side): Patients received 9 immediate implants placed in fresh extraction sockets without leucocytes platelet-rich fibrin (L-PRF) while Group II (L-PRF group or side): Patients received 9 immediate implants with leucocytes platelet-rich fibrin (L-PRF) positioned around immediately placed implants after extraction.

Pre-operative Phase: Clinical evaluation, including complete history taking (personal, medical, surgical, and dental history) and physical examination (general and local oral examination to assess vital signs, oral tissues, and implant site suitability), as well as routine laboratory investigations (CBC, ESR, CRP, liver/kidney functions, PT, PTT, INR). Radiographic assessment was performed using CBCT to evaluate bone quantity, quality, and approximation to anatomical structures) ensuring proper implant site selection and excluding patients with severe bone loss or pathological conditions. Preoperative CBCT was conducted using the Scanora 3D imaging system using a CMOS flat panel detector with isotropic voxel size 0.35 μm, the x-ray tube used to scan the patients possessed a current intensity 10 mA, 90 KVp and a focal spot size 0.5mm **(Fig. 1).**

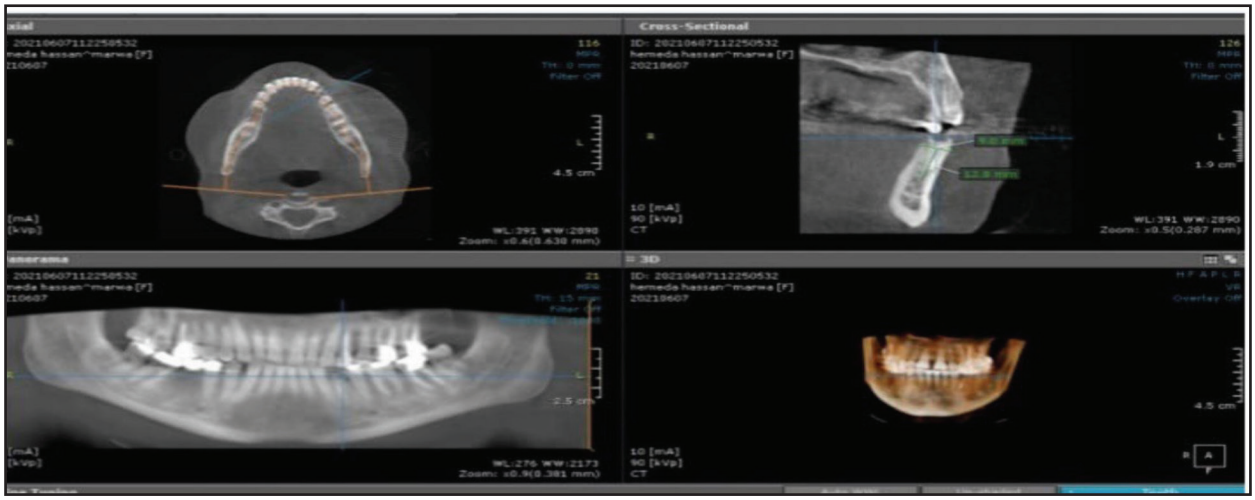

Fig. (1) CBCT to detect bone width and length at the proposed implant site.

Interocclusal arch space was determined preoperatively in the selected patients to ensure optimal implant placement.

Preoperative prophylactic antibiotics were given 24 hours preoperatively and continued for 5-7 days post-optatively, additionally, instructions for proper oral hygiene were provided to all patients to be conducted throughout and after the study period.

All surgical procedures were conducted under local anesthesia (Articaine hydrochloride four percent with 1: 100,000 epinephrine) using standardized atraumatic technique.

Surgical procedure for extraction and immediate implant placement in group I (control group):

A periodontal probe was applied buccally and lingually to measure the crestal bone loss from the gingiva to measure the bone height. Minimal force extraction was performed for the intended tooth, where a periotome was applied mesial and distal to the tooth/remaining root for wedging. Then, an appropriate forceps was used to remove the luxated tooth/remaining root, **(Fig. 2A, 2B**).

Implant insertion: DTI (Dental Technology Implants), Turkey, implants were used in the present study.

Osteotomy Preparation (Drilling Sequence) in immediate implants, drilling is done slightly lingual to gain primary stability in apical bone as follows: (**Fig. 2C**).

a. Pilot Drill (Initial Pathway): Using a 2.0 or 2.2mm twist drill, and slightly lingual to the socket center, 3–5 mm beyond the apex, drilling started to penetrate and gain anchorage in vital bone.

b. Parallelism: Use paralleling pins or indicators and alignment with adjacent teeth was checked.

c. Sequential Drilling: Following the implant system's drill sequence and depending on the final implant size, drilling was carried out with under-sizing slightly to increase primary stability, especially in softer bone under copious saline irrigation to avoid heat-induced necrosis.

Implant Placement (**Fig. 2D**): The appropriate implant was inserted immediately after final drilling, target 35–45 N-cm (Newton centimeter, a unit of torque) insertion torque was used to check for stability where the implant platform was ideally placed 1–2 mm apical to the buccal crest.

Cover Screw was placed and sutures were made to cover the implant. Then, post-operative instructions and follow-up was carried out. (**Fig. 2F**).

Primary implant stability was initially measured immediately after implant placement using the Ostell instrument with a Smart Peg linked to the implant. Suturing was then conducted over the placed implant. **Fig. (2E, 2F**). Finally, antibiotics (Amoxicillin trihydrate 875 milligram + Clavulanate potassium 125 milligram), anti-edematous medication (Chymotrypsin-Trypsin), and analgesics (Ibuprofen) was prescribed for each patient after the surgical procedure.

Surgical procedure for extraction and immediate implant placement and L-PRF application in study group II: (Figs. 3 & 4).

Minimal force was performed, and a periotome was applied mesial and distal to the remaining root for wedging, then an appropriate forceps was applied to remove the luxated remaining root. DTI implant with appropriate size and length was placed using the same technique described for group I.

Preparation of Leucocytes Platelet-Rich Fibrin: L-Platelet-rich fibrin was prepared utilizing Choukroun et al.'s [8] technique: ten milliliters

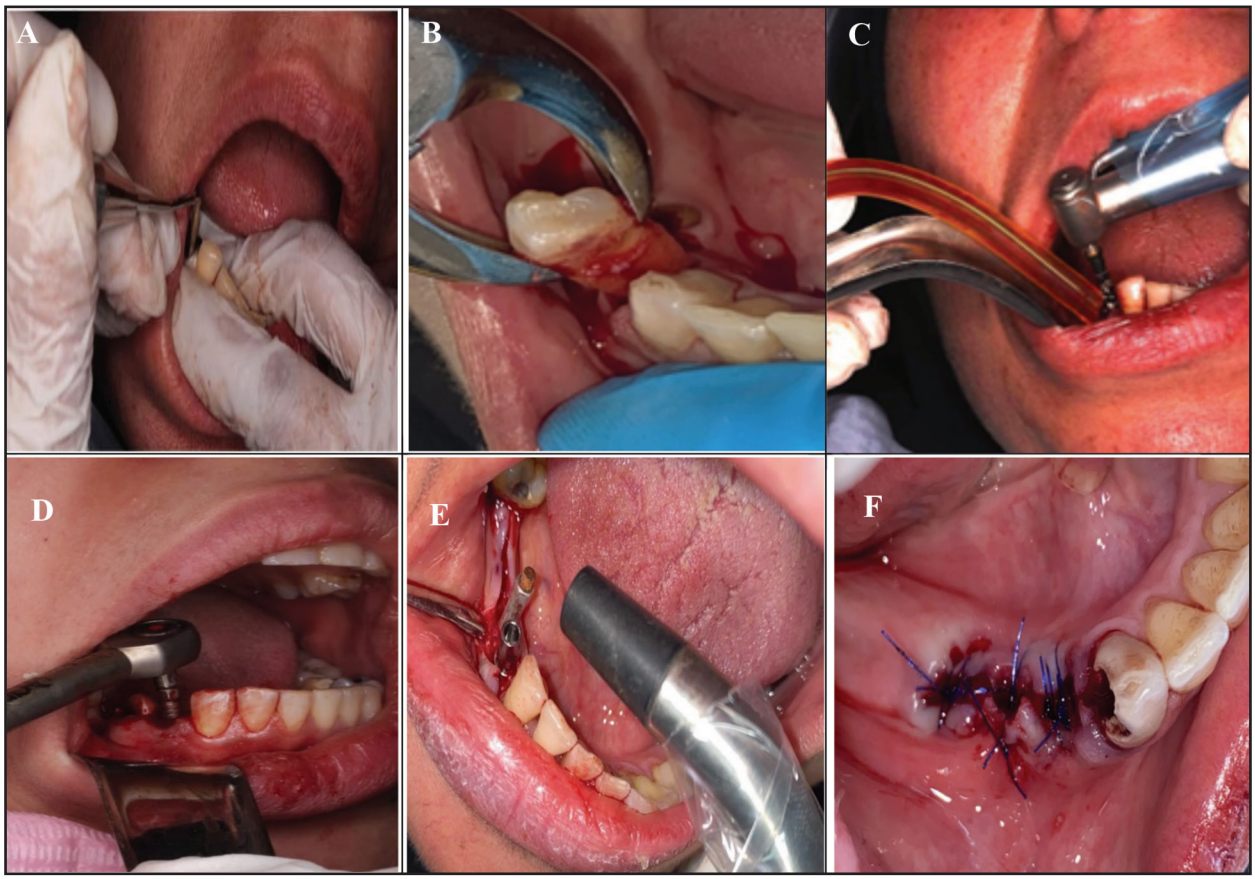

Fig. (2) (A): Photograph for using periotome. (B): Picture showing extraction. (C): Photograph showing osteotomy procedure for implant preparation. (D): Photograph showing final implant placement. (E): Photograph demonstrating smart peg linked to the implant for implant stability reading with the Ostell instrument. (F): Suturing of the surgical site.

of venous blood have been collected in a sterile tube without anticoagulant twenty minutes before surgery. After centrifugation at 3000 rpm for ten minutes, the platelet-poor plasma was discarded (superficial layer). Platelet-rich fibrin was dissected two millimeters less than the red corpuscle junction to involve residual platelets, compressed into a membrane, and used to be inserted into the osteotomy site before implant placement.

Implant stability was measured utilizing the Ostell device with a Smart Peg, followed by suturing. The wound was sutured with 3-0 prolene. Antibiotics (amoxicillin 875 mg + clavulanate 125mg), anti-edematous (chymotrypsin-trypsin), and analgesics (ibuprofen) were prescribed.

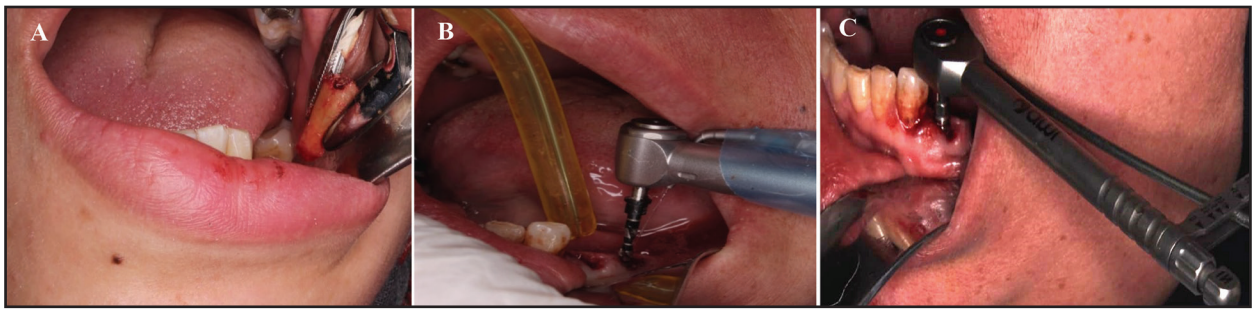

Fig. (3) (A): Photograph showing atraumatic extraction. (B): Impant preparation.(C): Implant placement.

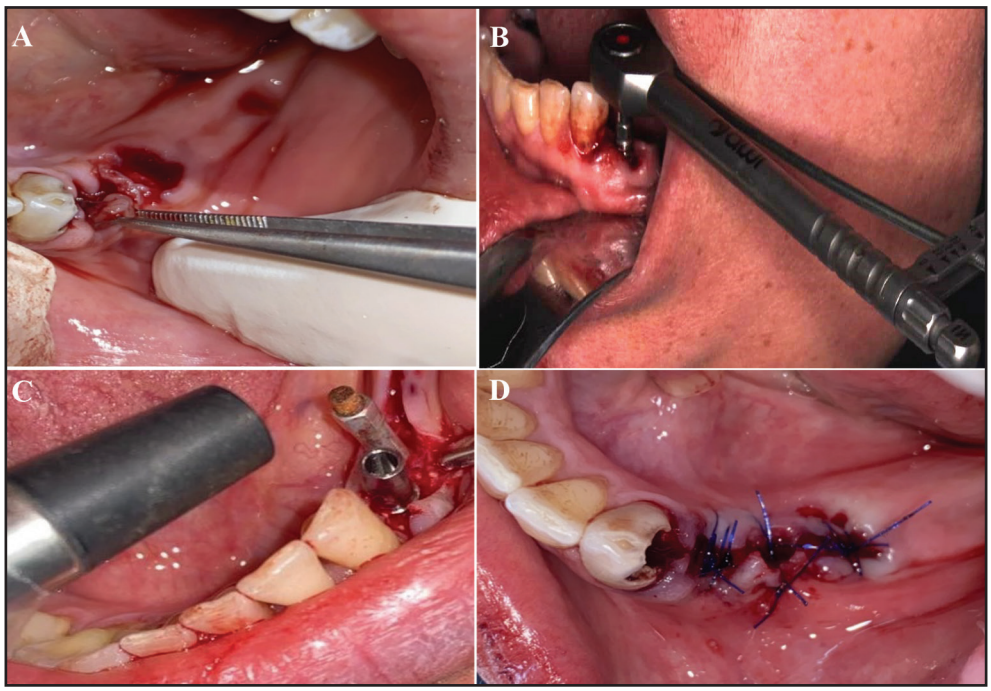

Fig. (4) (A): L-PRF inserted into the socket before implant placement. (B): Implant placement. (C): Photograph demonstrating smart peg linked to the implant for implant stability reading using Ostell instrument. (D): Suturing

Post-operative assessment:

Clinical assessment (immediate post-operative then after 6 months) and Radiographic assessment (after immediate placement, then after 3 months, and 6 months) follow-up was conducted for all patients as follows:

a. Clinical Assessment: Clinical assessment of implant stability was carried out using Ostell device. Ostell device enable enables precise and objective monitoring of osseointegration non-invasively through measuring implant stability (ISQ readings). A smart peg attached to the implant was connected to the device via a cable, and measurements were displayed on a backlit screen. Implant stability was evaluated initially at the time of placement, then reassessed following six months to guide abutment placement. If the Ostell reading was seventy or higher, the abutment was placed, and the final prosthesis was fabricated.

b. Radiographic Assessment: Radiographic assessment was carried out using intraoral paralleling periapical direct digital radiographic procedure. Semi-direct standardized digital radiographs were achieved using KaVo Scan eXam™ One and the Rinn extension cone paralleling (XCP) periapical film holder. The KaVo Scan eXam™ One is an intraoral digital imaging plate system (psp) system using Imaging plate which is a film-like, thin, flexible, and wireless phosphorescent plate, which works as a wireless receptor using imaging plate size 2 that has an active surface area of 31 X 41 mm, 1034x1368 micron (pixel size) and image size 2.69 megabytes. A long cone, (sixteen inch in length) was mounted to the x-ray tube and the plastic aiming ring of XCP film holder was fixed flush ended with the round end of the long cone. The imaging plate was exposed to the Fona XDC digital intraoral Xray machine.

The exposure parameters were considered fixed for all patients. Processing of the plate was conducted after the end of the exposure using Scan eXam™ One laser read-out unit, then, the image appears on the screen. The stored images of each patient were interpreted by one examiner at two different times to decrease intra observer errors and the mean of the two trials was recorded. Each patient was radiographically assessed immediately post-operative, after 3 months and after 6 months **(Fig. 5).**

Digital Image analyses and bone density calibration

Image analysis was performing using ***IDRISI Kilimanjaro*** software[10] which restored and enhanced images, subtracted the implant from the background, and measured bone density in two zones: the zone of osseointegration (zone 1; implant-bone interface) and zone 2: bone surrounding the zone of osseointegration (adjacent to first zone and represented the normal bone surrounding osseointegration zone). ***IDRISI Kilimanjaro*** software calibrated the image against 256 grayscale values (where 0 = black, 255 = white). Bone density at zone 1 was used to assess osseointegration of immediately-placed implants after 3- and 6-months following implant placement. Immediate post-operative radiographs were used as base line for successive comparisons **(Fig. 6).**

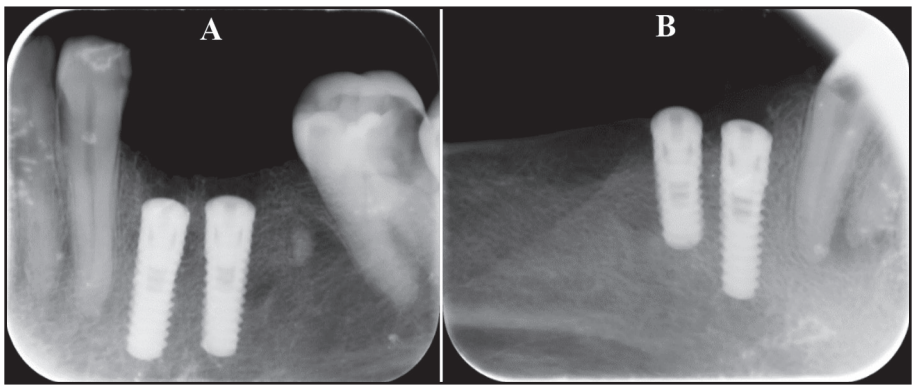

Fig. (5) (A): Digital X-ray for study group. (B): Digital X-ray for control group.

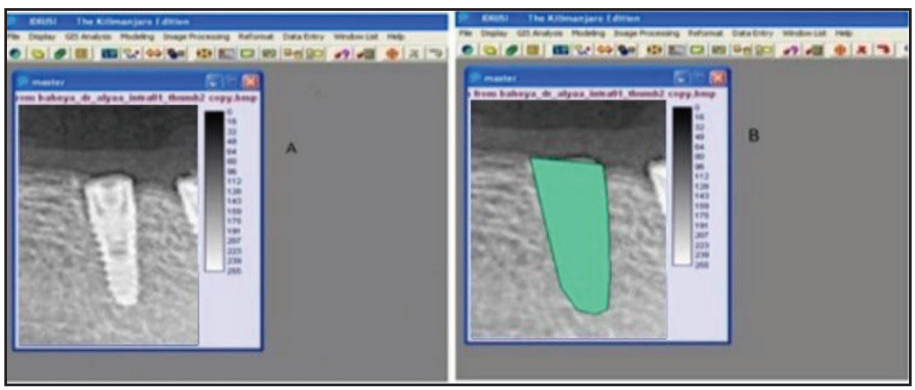

Fig. (6) Image showing subtraction of the implant from the surroundings.

Ethical Considerations

The data acquired from participants were considered confidential. The identities of the investigation's participants were anonymous in all reports or publications related to the study. Prior to the participants' admission to this investigation, the investigation's purpose, nature, and risk–benefit evaluation has been explained to them and an informed consent was acquired.

Statistical analysis

Based on a previous investigation by ***Omar et al***. [11] with a Periotest result of 3.49 and an SD of 2.69, the sample size has been measured, resulting in the recruitment of 18 implants. Data were analyzed utilizing SPSS version 26, with descriptive statistics (mean, SD, median, range, percentages) and analytic tests (Chi-square, Fisher's exact, Student's t-test, Mann–Whitney U). Significance levels were P-value more than 0.05, P-value more than 0.05 (non-significant), P-value below 0.05, P-value below 0.05 (significant), and P-value below 0.01. P-value below 0.01 (highly significant). Key parameters included mean, standard deviation, and Chi-square test for comparing observed and expected values.

RESULTS

The present study was conducted to assess the role of leucocyte platelets–rich fibrin in enhancing bone healing around immediate dental implants; clinically through evaluating implant stability using Ostell device, and radiographically through measuring relative bone density around the implants using IRRISI software. Study findings and comparisons between the control group and the L-PRF group are revealed in the following tables.

Table 1 demonstrated that, the mean of clinical test (OSTELL readings) at immediate post-operative was 62.2 (±3.8) for the control group, whereas in the L-PRF group, the mean was 67.8 (±3.4). After 6 months, the mean of the clinical test was 68.3 (±3.6) in the control group, whereas in the L-PRF group, the mean was 81.4 (±6.17). Upon comparing the implant stability readings immediate post-operatively with the 6-months follow-up within each group, a significant difference was seen in the control group, where as in the L-PRF group, a highly significant difference was revealed with p-value <0.001. Upon comparing group I to group II, a significant difference was seen immediate post-operative between both groups, however at 6-months, a highly significant difference was observed between both examined groups where the L-PRF group exhibited significantly higher Ostell readings (p= <0.001).

Table (1) *Implant stability values in group I and group II (OSTELL readings) and comparison between both studied groups.*

	Control group (n=9)		L-PRF group (n=9)		P-value
	Mean	**SD**	**Mean**	**SD**	
Immediate post-operative	62.2	3.8	67.8	3.4	0.004
6 M	68.3	3.6	81.4	6.17	<0.001
P-value	0.003		<0.001		_

P value above 0.05: Not significant, P value below 0.05 is statistically significant, p<0.001 is highly significant., SD: standard deviation.

Table 2 revealed that, the mean of radiographic relative bone density immediate post-operatively was 132.6 (±15.38) for the control group, whereas in the L-PRF group, the mean was 150.5 (±13.28). After 3 months, the mean of relative bone density

was 121.3 (±14.64) in the control group, whereas in the L-PRF group, the mean was 141.8 (±17). After 6 months, the mean of relative bone density was 151.7 (±16.68) in the control group, whereas in the L-PRF group, the mean was 186.5 (±19.03). Results showed statistically significant changes in both the control and PRF groups throughout follow-ups. Comparison between both groups showed statistically significant difference between them where the L-PRF revealed significantly higher density values at each follow-up, especially at 6 months.

Table (2) *Relative bone density values in group I and group II and comparison between both studied groups.*

	Control group (n=9)		L-PRF group (n=9)		P-value
	Mean	SD	Mean	SD	
Immediate	132.6	15.38	150.5	13.28	0.01
3 Months	121.3	14.64	141.8	17	0.01
6 Months	151.7	16.68	186.5	19.03	<0.001
Total p-value	<0.001		<0.001		
P1	0.29		0.51		
P2	0.04		<0.001		–
P3	0.001		<0.001		

p1= Immediate vs 3 Months, p2= Immediate vs 6 Months, p3 = 3 Months vs 6 Months

P value above 0.05: Not significant, P value below 0.05 is statistically significant, p<0.001 is highly significant., SD: standard deviation.

DISCUSSION

The current study was set to assess the utilization of leucocyte platelets–rich fibrin in bone healing around immediate dental implants. Such aim was the focus of several studies such as those previously conducted[10,12,13]. Platelet-rich fibrin (PRF) is a second-generation platelet concentrate, while leucocyte- platelet-rich fibrin (L-PRF) is a modified PRF biomaterial that is an autologous of multiple growth factors that harnesses the body's natural healing properties to accelerate tissue regeneration. It has been proven to enhance bone healing, therefore, may be used to promote osseointegration around immediate dental implants [5,14].

In the past decades, dental implantology has become one of the most widely used therapeutic options to treat edentulous patients. Dental implants serve as artificial roots in jaw bones without the risk of damaging natural teeth. Consequently, a well-established mechanical stability forms the biological basis for their successful use in daily life. This provides an indispensable mechanical microenvironment for the gradual establishment of bone healing [15].

The present study included eighteen dental implants placed in the mandibles of patients with badly decayed bilateral anterior or premolar teeth indicated for extraction and dental implant placement utilizing the split mouth technique since it ensures consistent clinical conditions between the study groups and more standardized results. Preoperative CBCT was made for all patients fulfilling the eligibility criteria to ensure accurate assessment of bone quality, implant positioning, and proximity to vital anatomical structures and detect proper width and length of implant fixture as CBCT allows three-dimensional analysis without superimposition as previously stated [16,17].

Immediate implants were placed in the sockets following atraumatic extraction of the tooth as it offers several advantages including reduced treatment time, preservation of bone and soft tissue, and potentially improved aesthetics as well as fewer surgical procedures [15,18].

Post-operative clinical assessment was conducted using Ostell device being an accurate method to evaluate implant stability as previously suggested [19]. Implant stability quotients (ISQ values) were obtained using Ostell device in a non-invasive manner by resonance frequency measurement immediately after implants' placement. The ISQ-values are used as indicator for mechanical implant stability, and seem to have predictive power for clinical outcome as formally mentioned [10 & 15].

Postoperative radiographic assessment was carried out using parallel periapical radiographs since this technique provides standardized imaging with minimal distortion and offers low radiation dose compared to other modalities. The paralleling technique ensures consistent angulation and reproducibility, which is essential for accurate comparison over time, particularly in evaluating crestal bone levels and relative bone density values around the implant. Additionally, the high-resolution nature of periapical radiographs makes them suitable for detecting early signs of bone loss or peri-implant pathology as reported [14 & 18].

IDRISI Kilimanjaro software was used in the present study for assessment of relative bone density around immediately placed implants. The investigation conducted by Harhash [20] reported that image analysis carried out by Kilimanjaro software enabled image quality improvement, and densiometric analysis. In addition, IDRISI software enables observation of alterations in the density of bone around implant images throughout different periods.

Results of the present study regarding clinical implant stability showed that measurements using Ostell immediately post-operative was 62.2 (±3.8) for the control group, and in the L-PRF group, the mean was 67.8 (±3.4). After 6 months, the mean of Ostell readings was 68.3 (±3.6) in the control group, whereas in the L-PRF group, the mean was 81.4 (±6.17). Such findings revealed statistically significant increase in implant stability values in both groups throughout the study period, with significantly higher increase in the L-PRF group.

Upon comparing control group to L-PRF group, a significant difference was seen immediate post-operative between both groups, however at 6-months, a highly significant difference was observed between both examined groups where the L-PRF group exhibited significantly higher Ostell readings ($p = <0.001$).

Regarding radiographic bone density at immediate post-operative, values were 132.6 (±15.38) for the control group, whereas in the PRF group, the mean was 150.5 (±13.28). After 3 months, the mean density value was 121.3 (±14.64) in the control group, whereas in the PRF group, the mean was 141.8 (±17). After 6 months, the mean density was 151.7 (±16.68) in the control group, whereas in the PRF group, the mean was 186.5 (±19.03).

In the current investigation, throughout the study follow-up period, there was a statistically significant elevation in relative bone density values after 6 months of follow-up in both the control and L- platelet-rich fibrin groups, however, the L-PRF group showed more significant increase in density values with time. In addition, after six months, there was a statistically significant difference between group I and II where L-PRF group showed significantly higher bone density values in the group treated with L-PRF denoting enhanced healing around the implant site.

Platelet-rich fibrin is reported to release transforming growth factorbeta1, platelet-derived growth factor-AB and vascular endothelial growth factor throughout extended time. Slow fibrin polymerization during platelet rich fibrin processing

leads to the intrinsic incorporation of platelet cytokines and glycanic chains in the fibrin meshes. Thus, platelet-rich fibrin, unlike the other platelet concentrates, would be able to progressively release cytokines during fibrin matrix remodeling, leading to enhanced healing properties in experimental and clinical situations [21]. Additionally, L-PRF clot involves the highest level of leukocytes and platelets from the collected blood, forming a robust fibrin structure with a 3-dimensional distribution of platelets and leukocytes as previously conducted [22,23].

An investigation assessing the impact of leukocyte platelet-rich fibrin therapy on bone levels and the clinical stability of dental implants was performed [12]. They revealed a marked enhancement in soft tissue healing and accelerated bone regeneration following the insertion of implants in direct extraction sockets. The leukocyte platelet-rich fibrin group demonstrated superior bone regeneration, soft tissue healing, and reduced complications following surgery in comparison to the control group. Their results were consistent with those of the present study.

Similarly, results of the present study were in agreement with an investigation conducted [13], who assessed the effect of leukocyte platelet-rich fibrin on the osseointegration parameters of dental implants. They stated that leukocyte platelet-rich fibrin demonstrated potential for enhancing the assessed osseointegration parameters at the 1st evaluation time point (3 months), which can ultimately reduce the time required to attain at the 2nd stability for implants positioned in expansive osteotomy sites (6 months).

Additionally, in a previous study [10], it was determined that leukocyte platelet-rich fibrin membranes surrounding implants enhanced the ISQ values of implants throughout a six-week monitoring period in comparison to the control group.

Our findings were corresponding with Ritto et al., [24], who evaluated the utilization of leukocyte platelet-rich fibrin in bone healing following mandibular 3rd molar removal. They revealed that the utilization of L-PRF enhanced bone density values, which was significantly greater in the test group compared to the control.

Other systematic assessments examining bone healing around immediate dental implants indicated that leukocyte platelet-rich fibrin effectively maintains the density and quality of the alveolar ridge while reducing buccal bone resorption [17 & 16].

The current investigation agreed [18], who assessed the impact of leucocytes platelet-rich fibrin (L-PRF) radiographically and clinically following delayed implantation of short dental implants. Their investigation showed that cases in the platelet-rich fibrin group around the short dental implants had superior clinical and radiographic characteristics than those in the control group in absence of L-PRF. The investigation demonstrated that the utilization of L- PRF alongside short dental implants in the molar region is an effective treatment, enhancing both soft and hard tissue healing and also enhancing implant primary stability through the initial phase of osseointegration.

In addition, our results agreed with the meta-analysis and systematic review [19], who investigated the result of platelet-rich fibrin utilization on implant stability. They stated that Leucocyte Platelet-rich fibrin may also accelerate bone repair and encourage the development of new bone at the implant site.

CONCLUSIONS

Based on the results of the current study, leucocyte-platelet-rich fibrin showed significant improvement in implant stability and bone healing and increased bone density around immediate dental implants. Although the process of preparing autologous leukocyte platelet-rich fibrin in a dental office may be time-consuming; it is advantageous to both the patient and the implantologist since it promises more favorable surgical outcomes. Additionally, it is cost-effective making L-PRF a new utilization of tissue engineering in the field of implantology.

RECOMMENDATIONS

It is advised for future investigations to be carried out utilizing large, comparative observational investigations or well-designed randomized controlled trials and the inclusion of a representative sample of cases with identical disease severity, gender, and age.

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