

Knowledge awareness practice survey on awareness of concentrated growth factor among dentists

M. Satya Prakash, Dhanraj M. Ganapathy*, Arunasree Vadaguru Mallikarjuna

ABSTRACT

Introduction: Different platelet concentrates such as platelet-rich plasma (PRP), platelet-rich fibrin (PRF), and concentrated growth factor (CGF) are used for reconstruction of bone defects. CGFs are created by centrifuging blood tests at rotating and controlled rates utilizing an uncommon rotator. CGF has demonstrated a high regeneration due to osteoinductive platelet factors and osteoconductive fibrin network. **Aim:** The aim of the study was to evaluate the awareness of CGF among dentists. **Materials and Methods:** A cross-sectional study was done among dentists. A sample size of 100 has been obtained, self-administered questionnaire containing 16 open questions was distributed. **Results:** Our study showed that most of the dental practitioners are not aware of CGF and the advantage of using it. 20.3% are aware of using CGF among dental practitioners. 92.2% are willing to attend courses and education programs on CGF and update their knowledge. **Conclusion:** Awareness of CGF should be created by conducting workshops and CDE programs as it has many advantages.

KEY WORDS: Autologous grafts, Concentrated growth factor, Growth factors, Osteoconductor, Osteoinductor.

INTRODUCTION

Different platelet concentrates, for example, platelet-rich plasma (PRP), platelet-rich fibrin (PRF), and concentrated development factor (CGF) are utilized to reproduce bone deformities.^[1] CGFs are created by centrifuging blood tests at substituting and controlled paces utilizing an exceptional rotator.^[2] CGF has demonstrated a higher recovery limit due to osteoinductive platelet factors and osteoconductive fibrin grid. Concentrated development factor is a novel second era platelet focus.^[3] CGF is fibrin-rich natural lattice which contains development factors, platelets, leukocytes, and CD34+ undeveloped cells which help in recovering procedure.^[4] In dentistry, numerous looks into of development factors appropriate to bone recovery systems perceived that the best tissue regenerative boost is available among the autologous development factors, which have clinically demonstrated to instigate recovery and tissue recuperating.^[5]

Planning CGF is an autologous arrangement taken from venous blood gathered in sterile Vacuette

tubes without anticoagulant arrangements. The tubes are centrifuged with one stage centrifugation convention: 30 s - increasing speed, 2 min - 2700 rpm, 4 min - 2400 rpm, 4 min - 2700 rpm, 3 min - 3000 rpm, and 36 s - deceleration and stop.

This outcome in four unique stages which are as per the following:

Periods of CGF:

1. Predominant stage - Serum
2. Interval stage - Fibrin buffy coat
3. Fluid stage - Growth factors
4. Lower stage - Red platelets

Stage 1

Superior stage is spoken to by serum. It is an unmistakable straw hued liquid which is a lightest and most fluid piece of blood. It contains 92% of water and 7% of different concentrates which incorporates proteins, glucides, amino acids, lipids, chemicals, hormones, and inorganic electrolytes. It is utilized to seal the draining vessels, wash the surgical site, coat, and ensure the recovered segments.

Stage 2

Interim stage is a fibrin buffy coat with polymerized fibrin square containing three-dimensional polymer

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Department of Prosthodontics and Implant Dentistry, Saveetha Dental College, Saveetha University, Chennai, Tamil Nadu, India

*Corresponding author: Dr. Dhanraj M. Ganapathy, Department of Prosthodontics and Implant Dentistry, Saveetha Dental College, 162, Saveetha University, Poonamallee High Road, Chennai - 600 077, Tamil Nadu, India. Phone: +91 9841504523. E-mail: dhanrajmganapathy@yahoo.co.in

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systems of fibrinogen atoms with interlaced filaments joined to shape a solitary stage as gel. At the point when seen under electron magnifying instrument this layer is constituted by thick and thin fibrillar components. Amid polymerization response the distance across of strands develop until end of the response. Amid polymerization it takes into account volume development of chains every which way. The fibrin pieces are of higher quality in view of the high grouping of fibrinogen, factor XIII and thrombin. Factor XIIIa, which is enacted by thrombin settles the fibrin coagulation and gives assurance from plasmin debasement, bringing about higher fibrin elasticity and solidness and draw out the length of development factor action, which is helpful for development factor collaboration and improves cell expansion and osteogenic separation.^[5] It is utilized as an autologous layer bolster, filling material in general or blended with bone particles.

Stage 3

Liquid stage contains development factors, white platelets and foundational microorganisms. These undeveloped cells can separate into their particular cell composes. This fluid stage is blended with autologous bone unite to get elite actuated join.

Stage 4

This lower stage is dim ruddy thick gel. It comprises high convergence of red platelets and furthermore few white cells, platelets, and thickening variables. It is utilized as a part of the unadulterated frame or blended with bone unions to fill expansive depressions.

Component

CGF discharges different development factors, for example, platelet-inferred development factor (PDGF), transforming development factor- β 1 (TGF- β 1), and TGF- β 2 (TGF- β 2), fibroblast development factor (FGF), vascular endothelial development factor (VEGF), brain determined development factor (BDGF), and insulin-like development factor which animate cell multiplication, grid redesigning, and angiogenesis.^[6,7] *In vitro* studies have demonstrated that development factors like TNF- α and BDGF indicated quick motor discharge from the think and achieved its greatest amassing in 1st and 3rd day separately. So also, PDGF-AB, TGF- β 1, and IGF-I had consistent active discharge and achieved its greatest in 3rd and 6th day individually.^[8] VEGF and bone morphogenetic protein -2 had moderate motor discharge and achieved its most extreme in the 8th day. These development factors prevalently assume a part in osteoblast expansion and separation. CGF acts by degranulation of the alpha granules in platelets that contain development factors which assume a fundamental part in early twisted recuperating. The biphasic platelets in CGF are quickened by thrombin, initiate the arrival of development factors

and different substances which improve the injury recuperating process by expanding cell expansion, grid arrangement, osteoid creation, connective tissue mending, angiogenesis, and collagen blend.^[9]

Capacities CGF is a fibrin tissue glue with hemostatic and tissue fixing properties. It advances wound recuperating and quickens osteogenesis. The CGF enhance the injury steadiness, which is basic for the foundation of another connective tissue connection to a root surface. It likewise gives a platform supporting cytokine connection and cell relocation.^[10] It also functions as a bearer for developmental factors. It is a powerful surgical hemostatic operator, advances epithelial, endothelial, and epidermal recovery and reductions dermal scarring have antimicrobial impact due high convergence of leukocytes. It has against angiogenic property on incessant non mending wounds.

Applications

CGF has an extensive variety of mending property in patients experiencing restorative surgeries such as facelifts, neck lifts, bosom increase, cardiovascular surgeries, oral, and maxillofacial surgeries. In dentistry, CGF is utilized to fill extraction attachments, fill the hole after cystectomy.^[11,12] In an examination, CGF has demonstrated to display predominant potential in sinus lift methodology and edge increase surgeries. CGF go about as a layer bolster in retreat scope as it continually discharges development elements to create tissue recovery. CGF is additionally blended with autologous bone particles or biomaterials to fill the bone deformities to incite bone recovery. In inserts, CGF is utilized as a film support to quicken bone combination.

Aim

The aim of the study was to evaluate the awareness of CGF among dentists.

MATERIALS AND METHODS

A cross-sectional study has been done among general dentist of sample size - 100. Self-administered questionnaire containing 16 open questions was distributed randomly to the general dentists. The questionnaire has been uploaded in the Google forms and the link has been shared. Obtained data have been given in the results.

RESULTS

Nearly 92.2% were aware of various grafts in dentistry. 37.5% of the participants have used graft materials. 76.6% said autograft were most effective, 17.2% - allograft, and 4.7% xenograft. 95.3% were aware of regenerative procedures. 96.3% were aware of osteogenesis, osteoinduction, and osteopromotion. 60.9% prefer PRF, 23.4% prefer PRP, and 15.6% prefer CGF. 93.8% were

aware of guided tissue regeneration. 64.1% were aware that CGF can be used in regenerative procedures. 34.4% - CGF is technique sensitive, 9.4 % mentioned it was not. 10.9% used CGF in dental procedures. 20.3% were aware of different parts of CGF. 64.1% thought that bone graft is needed with CGF. Only 21.9% - CGF preparing unit is near their area. 65.6% - CGF has more advantage than PRP. 82.8% are interested to attend courses on CRF. 92.2% think that CGF hand on courses should be conducted in dental colleges.

DISCUSSION

Implant stability is one in every of the vital parameters that assess the loading time and implant success. Investigators have counseled that implants with implant stability quotient (ISQ) <49 measured once placed must not be loaded during the 3-month healing period; implants with ISQ ≥ 54 could also be loaded.^[13] It is stressed that implants with low primer stabilization worth ought to be waited to achieve a stabilization worth adequate for prosthetic loading which they have to be protected against mechanical trauma and infection during this point.^[14] In some studies, there is a purposeful reduction in ISQ values measured someday once the location of implants Lindhe *et al.* have indicated that this reduction happens throughout 2nd–4th weeks period whereas Javed *et al.* have explicit that it happens as early as 4 days once the operation. During this study conjointly, a decrease within the 1st week ISQ values was determined within the control group.^[15] Investigators have recommended that this decrease in stability values and sequent increase is thanks to transforming occurring throughout bone healing. Within the implants within the study cluster, a rise or stability was determined. A statistically vital distinction was found between the study and management teams in every amount of research. This means that CGF administration affects the implant primer stability by fast the osseointegration method. Growth factors indicate that they accelerate tissue healing once they perform effectively. Enhanced collagen synthesis is assumed to play a task in increasing soft tissue resistance and within the initiation of callus formation in bone tissue. Thrombocytes (platelets) conjointly be with alternative thrombocytes, permitting the protein network to stay stable. Within this stable, protein clot formation is chemical attractants in encompassing cells such as cell adhesion proteins, thrombocytes, and plasma growth factor; a number of these mitogens are associated with direct osteogenic cell perform. Introduced in 1998 by Marx, PRP is employed in oral and external body part surgeries to hurry up the recovery of grafts in bone-grafted areas. Although several studies have shown that PRP affects bone healing absolutely, the results of another studies counsel otherwise. In recent years, the protoplasm-rich protein (PRF) was delineate by Choukroun as a second-generation platelet concentrate. PRF is outlined as blood cell and platelet-rich protein

biomaterial.^[16] PRF is employed to accelerate healing in sinus augmentation, socket healing once tooth extraction, filling of the cyst cavity, treatment of angularity defects in periodontology, and soft tissue injuries. The positive effects of blood product on healing have conjointly triggered the event of product in numerous concentrations.

Platelets are illustrious to unleash high quantities of issue|protein}s like platelet-derived growth factor (PDGF), TGF-b1 and b2, embryonic cell protein (FGF), tube epithelial tissue protein (VEGF), and insulin-like protein (IGF), that stimulate cell proliferation, matrix transforming, and development. Many techniques to gather blood platelet mixture are utilized to accelerate tissue healing in dental and medical field.^[17,18] Choukroun's PRF and Sacco's CGF are recently developed protoplasm aggregation. These two ways collect blood cell and protoplasm wealthy protein gel employing a natural {coagulation|curdling|clotting|naturalmethod|naturalaction|action|activity} process. Compared to PRP and PRGF, PRF, and CGF are easy to form and do not need any artificial or biomaterials, such as bovine coagulase and salt, to form gel condition. Thus, it is free from the danger of cross-contamination. Protein wealthy gel is understood to unleash slowly issue proteins such as reworking growth factor, platelet-derived protein, and tube epithelial tissue protein and accelerates new bone formation once it mixed with bone graft within the sinus. You *et al.* reported that {platelet|bloodprotoplasm|thrombocyte|protoplasm|living substance} wealthy protein gel will induce higher bone to implant contact than platelet wealthy plasma in bony defect around implant. Unlike PRF victimization constant natural process, CGF utilizes altered natural process speed from two, 400–2700 rev to isolate a lot of larger, denser and richer in growth factors enriched protein matrix. As different to bone substitutes, development factors improved protein gel unconcealed dynamic new bone arrangement inside the sinus while not the inconvenience of agent disease. PRF and CGF amid a packed layer like compose have conjointly been utilized as a substitute for financially available albuminoid hindrance films in target-chasing bone recovery to help tissue recuperating. Side effect process might be a troublesome site to position embed. Target-hunting guided bone regeneration (GBR) victimization bone graft and barrier membrane may be a well-established technique for augmentation of symptom alveolar ridges. For roaring GBR, the stability of bone graft, area maintenance, development, and tension-free primary suture are essential. Space maintenance with particulate bone graft ought to be provided throughout the healing amount. However, particulate bone graft is well-migrated once grafted on the big horizontal/vertical bone defect.^[19] To reconstruct giant one or two wall bony defect or for the third-dimensional ridge augmentation, bone append the albuminoid membrane

or atomic number 22 mesh is needed to contain particulate bone graft throughout healing; however, these procedures are surgically time overwhelming and technique sensitive. In addition, the first exposure of atomic number 22 mesh causes bone loss and infection that causes failure of bone augmentation.^[20] For solid area maintenance within the severely symptom process, block bone graft procedure is wide accepted; however, this system has many disadvantages such as early exposure of bone graft, neurosensory disturbance, redoubled patient's operative discomfort and surgical value, delayed surgical time, and extra surgery from donor website.^[21] As various to atomic number 22 mesh or block bone procedure, sticky bone was introduced in 2010 by authors. Sticky bone is a biologically solid bone graft that is entrapped in protein network. Sticky bone graft does not scatter even on being agitated with the cotton worker as a result of particulate bone powders is powerfully interconnected one another by protein network.^[22] Sticky bone has various advantages: (1) It is elastic, thus well custom-made over the varied form of the bony defect; (2) small and macro movement of grafted bone is prevented. That the volume of argument is kept up all through healing period, so the need of block graft and titanium work is limited; (3) fibrin organize entangles platelets and leukocytes to release growth factors, so bone regeneration and soft tissue are accelerated; (4) no biochemical additives are needed to make sticky bone unlike PRP or PRGF; and (5) fibrin interconnection minimizes soft tissue ingrowth into the sticky bone graft.

CONCLUSION

The survey concludes that only 20.3% are aware of using CGF among dental practitioners. The use of CGFs is very beneficiary and has more advantages. Hence, awareness of CGF can be spread through conducting conferences, workshops and CDE programs as 92.2% people are willing to attend the courses and education programs on CGF and update their knowledge.

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