DETERMINATION OF PROGNOSTIC ACCURACY OF GINGIVAL RECESSION CLASSIFICATION

Dissertation

Submitted to

BABU BANARASI DAS UNIVERSITY, LUCKNOW, UTTAR PRADESH

In the partial Fulfilment of the requirements for the Degree

of

MASTER OF DENTAL SURGERY

in

PERIODONTOLOGY

by

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(Faculty of Babu Banarasi Das University)

YEAR OF SUBMISSION:2019

ENROLLMENT NO. 115032822O8 **BATCH: 2015**

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TO

MY FAMILY

ACKNOWLEDGEMENT

"...Surely I come quickly. Amen. Even so, come Lord Jesus"

"The grace of our Lord Jesus Christ be with you all. Amen."

-Revelation 22:20 & 21.

I owe my deepest and heartfelt gratitude and praise to the most merciful, compassionate and forgiving ***Almighty & Heavenly Father*** *for my existence, my personal* ***Savior Jesus Christ*** *for redemption through His sacrifice and the* ***Holy Spirit*** *for His comfort and solace in every situation.*

It is with deep gratitude I thank my respected and esteemed guide ***Dr. Vandana A. Pant, M.D.S, Head and Professor, Department of Periodontics, Babu Banarasi Das College of Dental Sciences, Lucknow,*** *who provided the vision, advice and encouragement necessary for me to complete my dissertation with patience and kindness. Her vast knowledge and ability to achieve excellence has been valuable and I shall always remain grateful for the scholarly guidance so graciously provided by her.*

It is with immense gratitude that I acknowledge the kind support and help of my esteemed teacher and co-guide ***Dr. Ashish Saini, M.D.S, Reader, Department of Periodontics, Babu Banarasi Das College of Dental Sciences, Lucknow,*** *a professor blessed with foresight and ability to achieve excellence with a wealth of knowledge and clinical skill. His keen academic surveillance and unflinching support has made this dissertation possible.*

It gives me an immense pleasure to convey my deep indebtedness to my respected Principal, ***Dr. B Rajkumar****, for the permission and guidance during the conductance of this work.*

I extend my sincere thanks to the Professors and Readers of the department - ***Dr. Mona Sharma, Dr. Sunil Verma, Dr. Suraj Pandey,*** *and the Senior Lecturer -* ***Dr. Pranav Singh*** *for their kind support and continuous encouragement & valuable suggestions, whenever I approached them for help.*

I am thankful to ***Mr. Rajendra P. Mishra****, Statistician, Institute for Data Computing and Training, Lucknow, for providing valuable assistance in data analysis.*

I would like to thank my colleague ***Dr. Poonam Yadav*** *and my juniors ,* ***Dr. Ekta Dwivedi , Dr. Sangeeta Barman, Dr. Shikha Singh, Dr. Aditi Yadav, Dr. Neha Chan, Dr. Nidhi Chaudhary & Dr. Pallavi Goswami, Dr. Dilip Kumar Maurya and Dr. Chetan Chaudhary*** *for their support and help at the most crucial hours.*

These words of gratitude cannot fully express the love and adoration I bear for my beloved parents ***Mr. John Fred Samuel*** *and* ***Mrs. Janetta Mary Samuel****; my sister* ***Dr Janelle Freda Halder*** *and her husband* ***Mr Anup Kumar Halder*** *along with my brother* ***Dr Jeffrey Alfred Samuel*** *and his wife* ***Mrs Anita Nancy Samuel*** *and all my wonderful nephews for their undying support, encouragement, prayers and patience; so that I could take up this work confidently. My family's innumerable sacrifices have brought me to where I stand today and I will be eternally grateful to them.*

For those relatives I am blessed with who have supported and prayed for me with encouragement I sincerely thank ***Mrs. Sara Dkhar*** *and family,* ***Mrs. Lila Reddy, Mr. Samuel Reddy, Mr. A. K. Halder*** *and* ***Mr Ashith Kumar Halder*** *among many others who have been there throughout.*

Godly friends are the ones who pray for you and with you, those who encourage you upon this upward journey. For this immeasurable kind of encouragement and support I would like to thank ***Mrs. Shirley Sharma, Dr. Juliah Joseph, Dr. Linu Paulson, Ms. Nalini Mohan*** *and* ***Mrs. Baphylla Lyndoh*** *for being patient through thick and thin in the friendships cultivated.*

To the ones besides my family who never let me give up and encouraged me to push forward I thank ***Dr. Joshua Gisemba Okemwa****. For the kindness, patient care and laughter shared I will always be grateful. The best I appreciate* ***Mr. Gary Michael Royer*** *for giving me joy and a new perspective, here and for eternity.*

To all my well wishers *thank you does not suffice to convey my gratitude. God bless you as you look upward in anticipation for we are on the precipice of eternity to be wonderfully spent with unfathomable Agape.*

Dr. Jean Fernetta Samuel

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ABBREVIATIONS

CEJ	Cemento-enamel junction
GR	Gingival recession
GTR	Gingival tissue regeneration
PR	Palatal recessions
MGJ	Mucogingival junction
CAF	Coronally advanced flap
PRP	Platelet rich plasma
PRF	Platelet rich fibrin
LPF	Laterally positioned flap
SLCRF	Semilunar coronally re-positioned flap
CTG	Connective tissue graft
PRGF	Plasma rich in growth factors
AERSA	Avascular exposed root surface area
CRC	Complete root coverage
RC	Root coverage
CAL	Clinical attachment level
PD	Pocket depth
WKT	Width of keratinized tissue

GTH	Gingival thickness
SECT	Subepithelial connective tissue graft
ADM	Acellular dermal matrix
EMP	Enamel matrix proteins
MTR	Marginal tissue recession
F	Facial
L	Lingual
GRD	Gingival recession defects
PPP	Platelet-poor plasma
PPD	Pocket Probing Depth
RBC	Red blood corpuscles
KT	Keratinized tissue
NCCL	Non-carious cervical lesion
PDGF	Platelet derived growth factors
TGF-b	Transforming growth factors
GI	Gingival index
DD	Defect depth
WAG	Width of attached gingiva

Abstract

ABSTRACT

Gingival recession is defined as "the displacement of marginal tissue apical to the cemento-enamel junction (CEJ)." Several classifications of gingival recession have been proposed but many are inadequate when it comes to predicting prognosis of long term clinical root coverage.

The aim of our present study is to determine the prognostic outcome and accuracy after surgical treatment of gingival recessions classified under Kumar and Massamatti's classification of gingival recession.

Our objectives included analysis of root coverage in Class IA and Class IIB gingival recessions after coronally advanced flap surgical therapy along with PRF. We also determined the accuracy of prognosis under a new system of gingival recession classification, to enable better judgment of treatment outcomes more veraciously in the future.

Patients who presented with Class IA & IIB gingival recessions classified under Kumar and Massamatti's classification of gingival recession were selected. 40 sites fulfilling the inclusion and exclusion criteria were evaluated and clinical parameters of gingival index, defect depth, pocket probing depth, clinical attachment level and width of attached gingiva were recorded. Post surgical evaluations for these parameters were also done at 3 month and 6 month intervals, keeping the patients in maintenance phase therapy. These data were subjected to statistical analysis and results were obtained.

We observed significant and desirable improvement across all clinical parameters from baseline to 3 months and baseline to 6 months which remained statistically highly significant till our 6 month follow-up. Although between the 3 to 6 month

intervals clinical parameters showed a slight to marginal regression or rebound, this is an expected biological outcome.

We achieved statistically satisfactory and consistent results due to our choice of classification employed and class selection where the defect does not extend to the MGJ.

Introduction

INTRODUCTION

Gingival recession is defined as "the displacement of marginal tissue apical to the cemento-enamel junction (CEJ)."[1] Often the marginal tissue may lie at the level of alveolar mucosa, thus the term "marginal tissue recession" is considered to be more accurate than "gingival recession,".[2, 3]

Gingival recession occurs due to presence of periodontal disease and gingival inflammation, faulty tooth brushing, calculus deposits, incorrect occlusal relationships, uncontrolled orthodontics movements, etc. These can occur in single or multiple teeth at one or more surfaces and appear as localized or generalized gingival recession. Recession can occur with or without loss of attached tissue and clinically manifests as accentuated sensitivity, cemental erosion, root caries and, most important, it gives appearance of a long tooth disproportionate to adjacent teeth resulting in unaesthetic appearance.

Gingival recession (GR) can be adequately treated with surgical therapies which maneuver a pedicle flap over the defect or place a graft over the defect, with the use of resorbable or non-resorbable membranes in guided tissue recession techniques. The various surgical techniques are lateral pedicle flap, coronally advanced flap, free gingival graft, sub-epithelial connective tissue grafts, gingival tissue regeneration (GTR) techniques, etc.[4] These procedures are reported with varied clinical effectiveness.

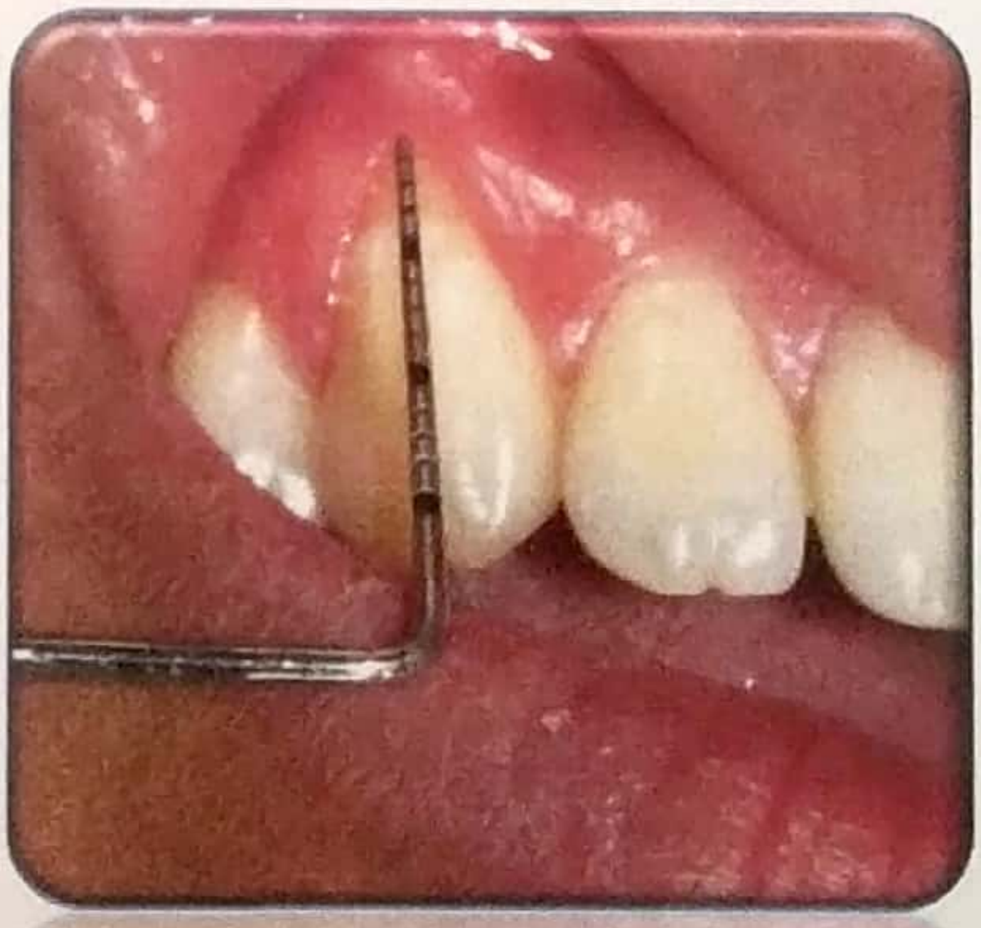
Several classifications of gingival recession have been proposed but many are inadequate when it comes to communicating all relevant information related to marginal tissue recession. With such varied clinical presentations of cases, it is not always possible to classify all gingival recession defects according to present classification systems, such as Miller's classifications[5] of gingival recession and others.[6,7,8] Also palatal recessions (PR) have not been classified.

Pertinent information increases efficacy and efficiency in providing diagnosis, predicting prognosis and choosing treatment plan. Ashish Kumar and Sujata Surendra Masamatti[9] in 2013 proposed a new classification system for gingival recessions. It contains certain features of Miller's classification[5] and Nordland and Tarnow's classification.[10] This proposed classification delineates a comprehensive depiction of recession defects that can be used to include cases that cannot be classified according to the commonly used Miller's classification. A separate classification system for palatal recessions (PR) was also proposed.[9]

Kumar and Massamatti's classification of gingival recession enhances and expands upon Miller's Class I and II categories differently wherein in their Class I there is no loss of interdental bone and in subclass IA the marginal tissue recession is coronal to the mucogingival junction (MGJ) whereas in subclass IB the marginal tissue recession is at or apical to the MGJ. Furthermore, in Kumar and Massamatti's Class II there is loss of interdental bone to a level coronal to facial cemeto-enamal junction (CEJ) and in subclass IIA there is no facial or lingual marginal tissue recession, in subclass IIB the marginal tissue recession is coronal to the MGJ and in subclass IIC the marginal tissue recession is at or apical to the MGJ.[9]

Miller's classification theoretically estimates 100% coverage for Class I and II recessions, partial root coverage in Class III and no root coverage in Class IV. Pini-Prato stated that anticipation of 100% root coverage does not mean that it will occur.[11] Root coverage percentage ranging from 9% to 90% have been reported by Miller himself along with several different authors, (eg, Paolantonio M, di Murro C, Cattabriga A, Cattabriga M, Trombelli L, Scabbia A, Wikesjö UM, Calura G), in Class I and II recessions using different techniques.[12, 13, 14]

Since there is such a wide variation in prognosis of gingival recessions classified by Miller's classification, hence the present study was undertaken using a more comprehensive and detailed Kumar and Massamatti's classification of gingival recession to determine prognostic accuracy of Class IA and Class IIB; to enable us and other clinicians to better judge treatment outcomes more veraciously in the future.



Aims & Objectives

AIM AND OBJECTIVES

The *Aim* of the present study was:

To determine the prognostic outcome and accuracy after surgical treatment of gingival recessions classified under Kumar and Massamatti's classification of gingival recession.

The ***Objectives*** of the present study were:-

1. To analyze root coverage in Class I and Class II gingival recessions after surgical therapy with pedicle flap therapies along with PRF.

2. To determine the accuracy of prognosis under a new system of gingival recession classification.

Review of Literature

REVIEW OF LITERATURE

Gingival Recession and Surgical Techniques for Root Coverage

Tarnow DP (1986)[16] described a semilunar coronally positioned flap. The technique involves a semilunar incision made parallel to the free gingival margin of the facial tissue, and coronally positioning this tissue over the denuded root. This technique has the advantage over other coronally positioned flaps, in that no sutures are required, there is no tension on the flap, there is no shortening of the vestibule, and the existing papillae are not interfered with.

de Waal H, Kon S, Ruben MP (1988)[17] stated that laterally positioned flap has shown itself to be the most predictable and aesthetically successful procedure in the treatment of mucogingival defects such as gingival/periodontal recessions and root exposures. They also stated that it is of utmost importance that the biologic principles of wound healing should be adhered to prior, during and after the surgical procedure.

Allen EP, Miller PD Jr (1989)[18] described the fairly known coronal positioning of existing gingiva in coronally advanced flap (CAF) may be used to enhance aesthetics and reduce sensitivity. Unfortunately when recession is minimal and the marginal tissue is healthy, many periodontists do not suggest treatment. They described a simple surgical technique of CAF with the criteria for its use which results in a high degree of predictability and patient satisfaction.

Trombelli L, Scabbia A, Wikesjö UM, Calura G (1996)[14] treated Class I and II Miller maxillary buccal recession defects in a split-mouth therapy to determine the effect of fibrin glue in addition to tetracycline HCI root conditioning and the coronally positioned flap procedure. 6 months post surgery, significant recession depth reduction and attachment gain were observed for both treatments resulting in no

clinical and statistical significant differences. This suggests that fibrin glue may not meaningfully enhance the outcome of these procedures.

Wennström JL (1996)[2] discussed alterations that occur during tooth movement in the mucogingival complex. He stated that the apico-coronal width of the gingiva (height) can be maintained and the risk for developing recession type defects occurs only when the tooth is moved outside its alveolar bone housing resulting in dehiscence.

Paolantonio M, di Murro C, Cattabriga A, Cattabriga M (1997)[13] compared Class I and II Miller gingival recessions, when treated with free gingival and bilaminar connective sub-pedicle grafts over a 5 year post operative period. They concluded that the sub-pedicle graft promises better results in the coverage of exposed root surfaces when compared with the free gingival graft.

Pini-Prato G, Baldi C, Pagliaro U, Nieri M, Saletta D, Rotundo R, et al (1999)[19] conducted a clinical study which was designed to determine if mechanical instrumentation (root planing) of the exposed root is useful in treating gingival recession caused by traumatic tooth brushing following a coronally advanced flap (CAF). Their prospective clinical, controlled, randomized study showed that mechanical instrumentation (root planing) of the exposed root surfaces is not necessary when shallow recessions caused by traumatic tooth brushing are treated using a CAF in patients with high levels of oral hygiene.

Saletta D, Pini Prato G, Pagliaro U, Baldi C, Mauri M, Nieri M (2001)[20] designed a study to verify if the dimension of the interdental papilla may be a prognostic factor for the clinical outcome of the CAF in the treatment of gingival recessions. They concluded that the root coverage following CAF procedure is not significantly

correlated to papilla dimension. However, complete root coverage is significantly more frequent in sites with lower height of the adjacent papilla.

Tözüm TF (2003)[21] focused on the importance of connective tissue grafting, combined with a recent approach known as the tunnel procedure, in managing gingival recession defects with a single operation. Clinical trials yielded good results, including early tissue healing because of increased blood supply, good aesthetic results, excellent patient cooperation and avoidance of secondary periodontal plastic surgery. These were the benefits of this technique, which improved the success rate of connective tissue grafting and increased the amount of root coverage.

Zucchelli G, Cesari C, Amore C, Montebugnoli L, De Sanctis M (2004)[22] evaluated the effectiveness with respect to root coverage of a modified surgical approach of the laterally moved flap procedure for the treatment of an isolated type of recession defect. They concluded that the laterally moved, coronally advanced surgical technique was very effective in treating isolated gingival recessions.

Huang LH, Neiva RE, Soehren SE, Giannobile WV, Wang HL (2005)[23] evaluated the effects of protein rich plasma (PRP) in combination with CAF. Based on the results of their study, the application of PRP in CAF root coverage procedure provided no clinically measurable enhancements on the final therapeutic outcomes of CAF in Miller's Class I recession defects.

Del Corso M, Sammartino G, Dohan Ehrenfest DM (2009)[24] highlighted some key issues related to the use of protein rich fibrin (PRF), it is a complex material frequently utilised during periodontal surgery in the last decade. First, a reproducible protocol for the production of PRF membranes must be followed to control the

quantity and quality of the fibrin matrix, leukocytes, platelets, and growth factors. Second, its use in periodontology must follow two principles founded on tissue-engineering basic rules and classical periodontal concepts. Using this two-principle safe protocol, the use of PRF in periodontal surgery led to a significant improvement during the early healing phase and to a thick and stable final remodelled gingiva.

Chambrone LA, Chambrone L (2009)[25] conducted a study to assess the clinical results obtained with laterally positioned flap (LPF) for the treatment of localized maxillary and mandibular gingival recessions (GR). Patients with maxillary recessions recorded statistically superior gains in the width of keratinized tissue than patients with mandibular recessions. The results of their study demonstrated that the LPF is an effective procedure to cover localized gingival recession. Moreover, width of keratinized tissue was statistically higher for maxillary recessions.

Santana RB, Mattos CML, Dibart S (2010)[26] compared the clinical outcomes of the semilunar coronally re-positioned flap (SLCRF) and CAF procedure in the treatment of maxillary Miller class I GR defects. Both flap designs were effective in obtaining and maintaining a coronal displacement of the gingival margin. Root coverage is significantly better with CAF compared with the original SLCRF technique in the treatment of shallow maxillary Miller class I GR defects.

Pini-Prato GP, Cairo F, Nieri M, Franceschi D, Rotundo R, Cortellini P (2010)[27] conducted a long-term study to compare the clinical outcomes of CAF alone versus coronally advanced flap plus connective tissue graft (CAF+CTG) in the treatment of multiple gingival recessions using a split-mouth design over 5 years of follow-up. CAF+CTG provided better root coverage than CAF alone in the treatment of multiple gingival recessions at the 5-year follow-up.

Pini Prato G, Rotundo R, Franceschi D, Cairo F, Cortellini P, Nieri M (2011)[28] conducted a long-term follow up, ie 14-year-randomized split-mouth study which was aimed at evaluating (1) the outcomes of two different methods of root surface modifications (root surface polishing versus root planing) used in combination with a CAF and (2) the long-term results of CAF performed for the treatment of single gingival recession. Their study showed that during a long-term follow-up, gingival recession recurred in 39% of the treated sites following the CAF procedure.

Lafzi A, Chitsazi MT, Farahani RM, Faramarzi M (2011)[29] conducted a study to evaluate the clinical efficiency of the CAF with and without plasma rich in growth factors (PRGF) in the management of gingival recession defects. Both treatment protocols led to a significant improvement in all measured variables compared to the baseline values, except the width of keratinized tissue. While PRGF enhanced the outcomes of CAF especially throughout the first month post-operatively, it offered no clinical advantage over CAF alone during the subsequent 2 months.

Fischer KR, Alaa K, Schlagenhauf U, Fickl S (2012)[30] presented a double sliding flap technique designed to meet the special requirements encountered in the often-fragile incisal mandibular area. Their surgical approach combined two laterally repositioned flaps with the dissection of the frenulum, to cover two deep neighboring recessions in the area of the central incisors. Providing that correct indication and adequate surgical tissue handling are used, this complex and advanced technique would have the potential to achieve complete long term root coverage and an aesthetically satisfying treatment outcome.

Gupta S et al (2015)[31] conducted a study to compare the clinical efficacy of CAF alone and in combination with autologous platelet rich fibrin membrane (PRF) in Miller's class I and II gingival recessions. Combination of PRF to CAF procedure did

not provide any added advantage in terms of recession coverage in Miller class I and II recessions.

Xie YF, Shu R, Qian JL, Lin ZK, Romanos GE (2015)[32] stated that surgical excision of gingival epulis, a benign hyperplasia of the oral soft tissues, always extends to the periosteum and requires scaling of adjacent teeth to remove any possible irritants. The aesthetics of the soft tissues may be compromised, however. Their study included three cases in which an immediate laterally positioned flap (LRF) was used to repair mucogingival defects after epulis biopsies. After 24 months, the colour and shape of the surgical areas were healthy and stable, nearly complete root coverage was evident, and no lesions reoccurred. For repairing gingival defects after biopsy, LRF appeared to be minimally traumatic while promoting aesthetic outcomes.

Ozcelik O, Seydaoglu G, Haytac MC (2015)[33] conducted a study to evaluate the reliability of the avascular exposed root surface area (AERSA) as a prognostic test for gingival recessions (GR) and to compare the predictive value of the avascular root surface area calculation and Miller classification on the final root-coverage outcomes. AERSA showed the highest sensitivity and specificity for predicting complete root coverage (CRC). Their prospective longitudinal study indicates that AERSA may be used to classify GR defects and this newly developed prognostic model may be used to predict the final root coverage outcomes.

Thamaraiselvan M, Elavarasu S, Thangakumaran S, Gadagi JS, Arthie T (2015)[34] conducted a study to determine whether the addition of an autologous PRF membrane to a CAF would improve the clinical outcome in terms of root coverage, in the treatment of isolated gingival recession. Root coverage (RC), clinical attachment

level (CAL), pocket depth (PD), and width of keratinized tissue (WKT) between the groups were not statistically significant. Conversely, there was statistically significant increase in gingival thickness (GTH) in the test group. The addition of PRF to CAF provided no added advantage in terms of root coverage except for an increase in GTH.

Aroni M A T et al (2016)[35] conducted a study to compare clinical findings obtained in the treatment of gingival recessions using subepithelial connective tissue graft (SECT), acellular dermal matrix (ADM), and enamel matrix proteins (EMP). The SECT and ADM groups had a higher percentage of root coverage and greater reduction in the height and width of gingival recessions compared to the EMP group ($p<0.05$). The SECT and ADM were more effective in treating gingival recessions than EMP.

Gingival Recession Classifications

Miller PD Jr (1985)[5] a recognized authority in mucogingival plastic surgery, classified diseased periodontal tissue into four basic categories based on changes in morphology of gingiva and predicted the final amount of root coverage post surgical therapy with free gingival graft procedure. The aim of this classification was to diagnose the severity of gingival lesions and predict a prognostic evaluation of the treatment.

Miller's classification described Class I as marginal tissue recession (MTR) not extending to the mucogingival junction (MGJ) with no loss of soft tissue and 100% root coverage. Class II is described as MTR extending to or beyond MGJ, no loss of

interdental bone or soft tissue and 100% root coverage. Class III is described as MTR extending to or beyond MGJ, loss of interdental bone or soft tissue is apical to the CEJ but coronal to the apical extent of MTR and Class IV is described as MTR extending to or beyond MGJ, loss of interdental bone extends to a level apical to the extent of MTR.

Nordland WP, Tarnow DP (1998)[10] developed a classification system for loss of papillary gingiva using readily identifiable anatomical landmarks for reference and categorises the degree of loss into three broad categories. They suggested the additional and incremental description further defined the defects and allows for quick descriptive assessment of gingival recession. In normal gingiva, interdental papilla filis the embrasure space to the apical extent of the interdental contact point area. They described Class I as tip of the interdental papilla lies between the interdental contact point and most coronal extent of the interdental CEJ. Class II is described as tip of the interdental papilla lies at or apical to the interproximal CEJ but coronal to apical extent of CEJ. Class III is described as the tip of the interdental papilla lies level with or apical to facial CEJ.

Mahajan A (2010)[7] attempted to emphasize the need to modify Miller's classification to make it more comprehensive and updated according to the recent concepts. His hypothesis discussed Miller's classification and pointed out some inherent limitations associated with it. As every classification evolves with time the hypothesis stressed upon the fact that Miller's classification should also be updated, if not completely changed, to cope up with the advancements in the diagnosis and treatment plan of gingival recession defects. The objective of Mahajan's criteria was to differentiate between the severity of bone loss or soft tissue in Class III and Class IV of Miller's

classification. Class III modification described gingival recession defect with bone or soft tissue in the interdental area up to cervical 1/3rd of root surface area and/ or malpositioning of teeth. Class IV modification described gingival recession defect with bone or soft tissue in the interdental area greater than cervical 1/3rd of root surface area and/ or malpositioning of teeth.

Pini-Prato G (2011)[11] described certain desirable characteristics for a system of classification such as usefulness, exhaustiveness, disjointedness and simplicity given by Murphy 1997. According to Murphy's statement Miller's classification was evaluated and its limitations for diagnosis and prognosis were delineated. Miller's classification when evaluated according to Murphy's statement was found to be useful as it distinguished recessions related to tooth brushing trauma (Classes I and II) from those caused by periodontal disease with interproximal attachment and bone loss Classes III and IV). In terms of exhaustiveness it was found that it did not consider all cases of recession. For example marginal tissue bone loss that does not extend to the MGJ is not classified and palatal recessions are not included. In terms of disjointedness, mid-facial level of the two teeth on either side is taken as reference point so in cases of missing adjacent tooth there is no reference point and cannot be included in Class II and IV. In terms of simplicity, Miller's classification appears simple but is not so easy to use owing to many reference points and presence of tooth malposition and tooth loss.

Considering that Miller's classification has its limitations the present study was undertaken with a new classification system which is more elaborative and comprehensive in its description. Thus the present study was undertaken with the newer and more descriptive classification proposed below to evaluate the prognostic

accuracy and outcome of treatment with CAF. Due to its specificity we hope to evaluate the prognostic efficacy more accurately and with veracity.

Kumar A, Masamatti S (2013)[9] proposed a new classification system which gives a comprehensive depiction of recession defect that can be used to include recession cases that cannot be classified according to present classifications. It outlines the limitations of present classification systems and also the inability to classify palatal recessions and proposes a separate classification system for palatal recessions. Kumar and Masamatti's description of their new proposed classification included gingival recessions presenting on both the facial (F) and lingual (L) aspects of the tooth and are as follows:

Class I deals with marginal tissue recession with no loss of interdental bone or soft-tissue. Class II and III deal with the loss of interdental bone/soft-tissue with/without marginal tissue recession.

Class I

There is no loss of interdental bone or soft-tissue.

- Class I-A: Gingival margin on F/L aspect lies apical to CEJ, but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ.
- Class I-B: Gingival margin on F/L aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ.

Either of the subdivisions can be on F or L aspect or both (F and L).

Class II

The tip of the interdental papilla is located between the interdental contact point and the level of the CEJ midbuccally/mid-lingually. Interproximal bone loss is visible on the radiograph. This is sub-classifed into three categories:

• Class II-A: There is no marginal tissue recession on F/L aspect.

• Class II-B: Gingival margin on F/L aspect lies apical to CEJ but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ.

• Class II-C: Gingival margin on F/L aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ. Either of the subdivisions can be on F or L aspect or both (F and L).

Class III

The tip of the interdental papilla is located at or apical to the level of the CEJ mid-buccally/mid-lingually. Interproximal bone loss is visible on the radiograph. This is sub-classifed into two categories:

• Class III-A: Gingival margin on F/L aspect lies apical to CEJ, but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ.

• Class III-B: Gingival margin on F/L aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ.

Classification of palatal gingival recession

The position of interdental papilla remains the basis of classifying gingival recession on palatal aspect. The criteria of sub-classifications have been modified to compensate for the absence of MGJ.

PR-I deals with marginal tissue recession on palatal aspect with no loss of interdental bone or soft-tissue.

PR-II and PR-III deal with the loss of interdental bone/soft tissue with marginal tissue recession on palatal aspect.

Palatal Recession-I

There is no loss of interdental bone or soft-tissue. This is sub-classified into two categories:

PR-I-A: Marginal tissue recession ≤3 mm from CEJ.

PR-I-B: Marginal tissue recession of >3 mm from CEJ.

Palatal Recession-II

The tip of the interdental papilla is located between the interdental contact point and the level of the CEJ mid-palatally. Interproximal bone loss is visible on the radiograph. This is sub-classified into two categories:

PR-II-A: Marginal tissue recession ≤3 mm from CEJ.

PR-II-B: Marginal tissue recession of >3 mm from CEJ.

Palatal Recession-III

The tip of the interdental papilla is located at or apical to the level of the CEJ mid-palatally. Interproximal bone loss is visible on the radiograph. This is sub-classified into two categories: PR-III-A: Marginal tissue recession ≤3 mm from CEJ.

PR-III-B: Marginal tissue recession of >3 mm from CEJ.

Jain S, Kaur H, Aggarwal R (2017)[6] stated that various classifications have been proposed to classify gingival recession. Miller's classification of gingival recession is most widely followed. With a wide array of cases in daily clinical practice, it is often difficult to classify numerous gingival recession cases according to defined criteria of the present classification systems. This article outlines the limitations of past and present classification systems that have been proposed to classify gingival recession. They recommended that the classification system which is suitable for a particular case should be used as all classifications have inbuilt drawbacks and none can actually serve the whole purpose. Each system has an advantage and disadvantage that can be appreciated with time and continued use.

Reliability of New Classifications

Mahajan A, Kashyap D, Kumar A, Mahajan P (2014)[36] tested the new classification system of gingival recessions in a total of 175 gingival recessions in 26 patients. The intra-class correlation coefficient for inter-rater agreement was 0.90, showing an almost perfect agreement between the examiners. They concluded that the newly proposed classification system eliminates the drawbacks and limitations associated with Miller's classification system and can be used to classify gingival recession defects (GRD) reliably.

Kumar A, Gupta G, Puri K, Bansal M, Jain D, Khatri M, & Masamatti SS (2015)[37] conducted a study wherein they classified gingival recessions using both Miller's and Kumar and Masamatti's classification systems of gingival recession. Percentage comparison of the application of both classification systems was done. Data analysis showed that though all the cases of the recession were classified by

Kumar and Masamatti's classification, only 34.61% cases were classified by Miller's classification. The elaborative evaluation of both buccal and palatal/lingual recession by the Kumar and Masamatti's classification system can be used to overcome the limitations of Miller's classification system, especially the cases with interdental loss and having marginal tissue loss coronal to MGJ.

Prevalence Studies on Gingival Recession

Kassab MM, Cohen RE (2003)[38] reviewed cross-sectional epidemiologic studies of gingival recession and found that they correlated the prevalence of recession to trauma, gender, malpositioned teeth, inflammation and tobacco consumption. They proposed that recession is multifactorial, with one type being associated with anatomical factors and another type with physiological or pathological factors. Treatments should typically result in aesthetic improvement, elimination of sensitivity and a decreased risk of developing root caries.

Susin C, Haas AN, Oppermann RV, Haugejorden O, Albandar JM (2004)[39] conducted an epidemiological study of gingival recession in a representative, urban Brazilian population and assessed various risk indicators. The prevalence, extent, and severity of recession correlated with age. The percentage of teeth with recession was significantly higher in the lower socioeconomic groups irrespective of age. Using a multivariable model, cigarette smoking and presence of supragingival calculus were the factors most significantly associated with localized and generalized recession, whereas gender, dental visits, and socioeconomic status were not significant risk indicators. The high level of gingival recession in this Brazilian population may be primarily related to destructive periodontal disease and is significantly associated with a high level of supragingival dental calculus and cigarette smoking.

Platelet Rich Fibrin

Choukroun J et al (2006)[40] conducted a study where investigations were made into the previously evaluated biology of PRF with the first established clinical results, to determine the potential fields of application for this biomaterial. The reasoning is structured around 4 fundamental events of cicatrization, namely, angiogenesis, immune control, circulating stem cells trapping, and wound-covering epithelialization. All of the known clinical applications of PRF highlight an accelerated tissue cicatrization due to the development of effective neovascularization, accelerated wound closing with fast cicatricial tissue remodelling, and nearly total absence of infectious events. Their initial research therefore made it possible to plan several future PRF applications, including plastic and bone surgery, provided that the real effects are evaluated both impartially and rigorously.

Dohan DM, et al (2006)[15] conducted a study to investigate the platelet-associated features of PRF as a biomaterial. During PRF processing by centrifugation, platelets are activated and their massive degranulation implies a very significant cytokine release. They undertook to quantify PDGF-BB, TGFβ-1, and IGF-I within PPP (platelet-poor plasma) supernatant and PRF clot exudate serum. Their initial analyses revealed that slow fibrin polymerization during PRF processing leads to the intrinsic incorporation of platelet cytokines and glycanic chains in the fibrin meshes. This result implied that PRF, unlike the other platelet concentrates, would be able to progressively release cytokines during fibrin matrix remodelling; such a mechanism explained the clinically observed healing properties of PRF.

Aroca S et al (2009)[41] conducted a study to evaluate the additional effect of PRF in CAF for the treatment of gingival recession. They concluded that the addition of a

PRF membrane positioned under the CAF provided inferior root coverage but there was an additional gain in GTH at 6 months compared to conventional therapy.

Anilkumar K, Geetha A, Umasudhakar, Ramakrishna T, Vijayalakshmi R and Pameela E (2009)[42] described a recent innovation in dentistry is the preparation and use of platelet-rich plasma (PRP), a concentrated suspension of the growth factors, found in platelets. These growth factors are involved in wound healing and are postulated as promoters of tissue regeneration. Their study reported the use of PRF membrane for root coverage on the labial surfaces of the mandibular anterior teeth using laterally displaced flap technique with PRF membrane at the recipient site.

Aleksic Z, Jankovic S, Dimitrijevic B, Diynic-Resnik T, Milinkovic I, Lekovic V (2010)[43] conducted a study designed to evaluate clinical effectiveness of activated platelet-rich fibrin (PRF) membrane in treatment of gingival recession. The results of their study confirmed both procedures as effective with equivalence of clinical results in solving gingival recession problems. The utilization of the PRF resulted in a decreased postoperative discomfort and advanced tissue healing.

Kumar A P, Fernandes B, Surya C (2011)[44] stated that PRF is a novel treatment option available for various mucogingival defects with varied outcome. Although it is in its infancy, the best part of platelet-rich fibrin is acquirement of optimal aesthetic results with excellent soft tissue contour and texture. Their case report highlighted the usage of platelet rich fibrin membrane for the treatment of mucogingival defects such as gingival recession.

Naik B, Karunakar P, Jayadev M, Marshal VR (2013)[45] described platelet rich fibrin as a fibrin matrix in which platelet cytokines, growth factors, and cells are trapped and may be released after a certain time and that can serve as a resorbable membrane. Autologous PRF is considered to be a healing biomaterial and studies have shown its application in various disciplines of dentistry.

Chandran P, Sivdas A (2014)[46] reviewed the role of PRF in periodontal regeneration and concluded that PRF is a powerful healing biomaterial with inherent regenerative capacity and can be used in various procedures such as for the treatment of periodontal intra-bony defects, treatment of furcation, sinus lift procedures and as a scaffold for human periosteal cells in vitro, which finds application in tissue engineering.

Keceli HG et al (2015)[47] conducted a randomized controlled trial to evaluate the adjunctive effect of PRF to CTG in the treatment of buccal recession defects. According to the results, PRF did not develop the outcomes of CAF+CTG treatment except increasing the tissue thickness.

Hehn J et al (2016)[43] conducted a randomized controlled clinical trial to evaluate the effect of PRF on soft tissue thickening and bone loss around implants. Their study concluded that soft tissue augmentation with PRF performed with a split-flap technique cannot be recommended for thickening thin mucosa.

Arunachalam M et al (2016)[49] stated that in patients with periodontitis, regeneration of the lost tissues has faced difficulties primarily due to the lack of support during the intricate healing processes. PRF has been considered to be an important, easy to obtain, predictable surgical additive for periodontal regeneration. This autologous scaffold provides the much needed bio-chemical mediators which have the potential

for enhancing reconstruction of the periodontium. Their review tried to understand why PRF would be an important link to reach predictable periodontal regeneration.

AL Jasser R, AlKudmani H and Andreana S (2017)[50] conducted a review which indicated no statistical or clinical difference in the use of PRF when compared to CAF procedures without PRF. This lack of statistical difference made PRF an enhanced companion with CAF for soft tissue regeneration in the treatment of Miller class I and II gingival recession. They found that the reduced post-operative pain and accelerated healing gained by the addition of PRF offers an advantage of using it compared to CTG or EMD which also needs to be confirmed by future clinical and histological evaluation.

Materials & Methods

MATERIALS AND METHODS

A clinical longitudinal prospective study was carried out in the Department of Periodontics, Babu Banarasi Das College of Dental Sciences (BBDCODS), Lucknow, India.

Patients who presented with Class IA, IB & IIB, IIC gingival recessions classified under Kumar and Massamatti's classification of gingival recession were selected based upon the following inclusion and exclusion criteria.

Inclusion criteria:-

1. Both genders between the ages 18 – 45 years.
2. Patients exhibiting single/multiple teeth with gingival recession in single-rooted teeth.
3. Patients willing for proposed surgery and treatment.
4. No history of treatment in the recession site.
5. Absence of bleeding on probing at selected sites at the time of surgery.
6. Absences of frenal or muscle pull.
7. Absence of crowding of dentition.

Exclusion Criteria:-

1. Pregnant and lactating women.
2. Smokers, tobacco and/or pan masala chewers.
3. Absence of an identifiable CEJ, and/or presence of grooves, irregularities, caries or restorations in area to be treated.
4. Patients with history of any systemic diseases that affect the periodontal status.
5. Uncooperative patients.

Materials:-

1. Local anaesthetic agent 2% Lignocaine (Xicaine, ICPA Health Products Ltd., Mumbai, INDIA).
2. Syringe 3ml and 5ml.
3. Mouth mirrors and UNC-15 Probe (Hu-Friedy Mfg, Co. LLC. Chicago Illinois, US).
4. BP blade handle and blade no. 12, 15.
5. Periosteal elevator (GDC Fine Crafted Dental Pvt Ltd. Hosiarpur, Punjab, INDIA).
6. Adams tissue holding forceps (GDC Fine Crafted Dental Pvt Ltd. Hosiarpur, Punjab, INDIA).
7. A set of surgical curettes (Hu-Friedy Mfg, Co. LLC. Chicago Illinois, US).
8. Castroviejo scissors, needle holder (GDC Fine Crafted Dental Pvt Ltd. Hosiarpur, Punjab, INDIA).
9. Platelet Rich Fibrin (PRF).
10. PRF centrifuge (Yorco scientific Udyog Pvt. Ltd. Ghaziabad, Uttar Pradesh, INDIA)
11. Sutures (4-0) non-resorbable braided silk.
12. Coe-pack dressing. (GC America Inc. Alsip, Illinois, US).

Study Design:-

Ethical clearance was obtained from the ethical committee of BBDCODS. Selected patients were motivated for the required treatment and the treatment procedure and prognosis were fully explained to them. A duly signed consent form was taken from each patient before initiating treatment. 40 sites fulfilling the inclusion and exclusion criteria were evaluated and assessed under Kumar and Masamatti's classification for gingival recession which is delineated below:-

Class I - There is no loss of interdental bone or soft tissue. This is sub-classified into two categories:

- **Class I-A:** Gingival margin on facial/lingual aspect lies apical to CEJ but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ.

- **Class I-B:** Gingival margin on facial/lingual aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ.

Class II – The tip of the interdental papilla is located between the interdental contact point and the level of the CEJ mid-bucally/mid-lingually. The interproximal bone is visible on the radiograph. This is sub-classified into three categories.

- **Class II-A**: There is no marginal tissue recession on facial/lingual aspect.

- **Class II-B**: Gingival margin on facial/lingual aspect lies apical to CEJ but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ.

- **Class II-C**: Gingival margin on facial/lingual aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ.

Class III: the tip of the interdental papilla is located at or apical to level of CEJ mid-bucally/mid-lingually. The interproximal bone is visible on the radiograph. This is sub-classified into two categories:

- **Class III-A:** Gingival margin on facial/lingual aspect lies apical to CEJ but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ.

- **Class III-B:** Gingival margin on facial/lingual aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ.

A short pilot study for clinical evaluation of gingival recession was carried out among patients who came to the OPD at the Department of Oral Medicine and Radiology, Babu Banarasi Das College of Dental Sciences (BBDCODS), Lucknow, India. Patients presenting with gingival recession were assessed by a single examiner to find the percentage of recession cases present in different classes of the new classification proposed in 2013 by Kumar and Masamatti. A 100 sites of gingival recession were examined and classified according to this classification. This assessment was done to determine the prevalence of types of classes of gingival recession. The assessment was done with no age and gender bar; patients who were evaluated ranged from between the ages of 18-70 years, 17 male and 6 female (total of 23 subjects and 100 defect sites).

The following results were obtained:

27 gingival recession sites were found with Class IA recessions, no cases were found with Class IB recessions, 2 gingival recession sites were found with Class IIA

recessions, 30 gingival recession sites were found with Class IIB recessions, 1 gingival recession site was found with Class IIC recession, 33 gingival recession sites were found with Class IIIA recessions and 7 gingival recession sites were found with Class IIIB.

From the above assessment it is clear that the most commonly occurring recession defects were that of Classes IA, IIB and IIIA. However, it should be noted that defects of class IIIA only presented in patients ages 60 years and above except for one patient. The Class IIIA cases most commonly occurred in patients whose age range was not part of our inclusion criteria of our study and we proceeded with the study for the former two class categories.

All study subjects of Class IA and Class IIB, received initial therapy including oral hygiene instructions, full mouth scaling and root planing before undergoing surgical therapy. At the time of surgery autologous PRF was prepared and gingival recession defects were surgically treated with pedicle flap surgeries with PRF.

Methodology:-

At baseline, 3 months and 6 months the following clinical parameters were recorded:

- Gingival Index (defect specific) (Loe and Silness, 1963).
- Recession depth (measured from the cemento enamel junction (CEJ) to the most apical extension of the gingival margin).
- Recession width (measured buccolingual distance between marginal tissue measured at a point midway/halfway of the apico-coronal depth of the defect).

- Pocket Probing Depth (PPD) (measured from the gingival margin to the bottom of the gingival sulcus).

- Clinical attachment level (CAL) (measured from the CEJ to the bottom of the gingival sulcus).

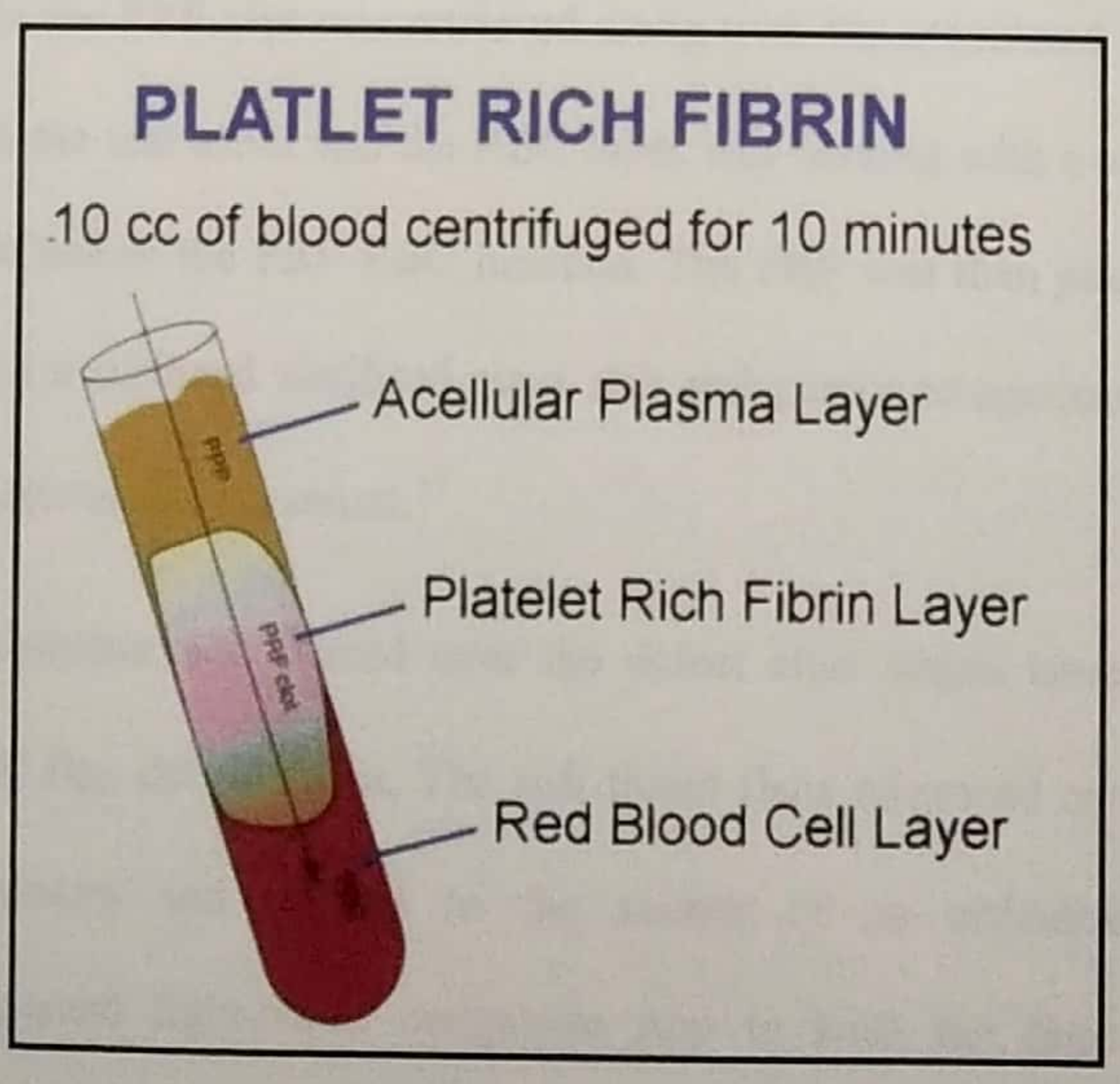
- Radiograph (IOPA) (at baseline only).

Surgical Procedure:-

Procurement of PRF:-

To obtain PRF, 10 ml blood was drawn from the median cubital vein at the cubital fossa after the skin was scrubbed with a spirit swab. Blood was placed in sterile test-tube without anticoagulant and centrifuged promptly at 3000 rpm for 10 minutes using the centrifuge (Yorco scientific Udyog Pvt. Ltd.). The resultant product consisted of the following 3 layers.

Plate No. I



1. Topmost layer – Acellular platelet poor plasma (PPP)
2. Middle layer – Platelet rich fibrin (PRF)
3. Bottom layer – Red blood corpuscles (RBC).

Surgical Procedure:-

All subjects included in the study underwent Phase I therapy and were recalled after two weeks for surgical intervention. The clinical parameters were recorded at baseline followed by the surgical procedure under aseptic conditions. The operative site was then anesthetized with 2% Lignocaine with 1:200,000 adrenaline. Sulcular and two vertical incisions were given and full thickness flap was reflected till the mucogingival junction and then partial thickness flap was further reflected to facilitate coronal or lateral advancement of the flap. Debridement and root planing were thoroughly done at the surgical site and the surgical area was irrigated with sterile saline.

Following this the PRF clot was retrieved along with the associated RBC layer with tweezers from the test tubes and the RBC layer was severed with a scissors from the PRF layer just below the PRF-RBC junction. The PRF was then placed upon sterile gauze piece on a surfaced sterilised glass slab and gently compressed using another glass slab to remove excess serum.[15]

This PRF membrane was placed over the defect sites which have been prepared during surgical flap debridement. The soft tissue flaps advanced coronally over the exposed cementum and sutured to the anchor of an orthodontic bracket or interdentally placed light-cured composite stop to keep the flap in the desired

position. [Plate no. I] Thus depending on the case, single sling sutures and interrupted sutures were used to close the advanced flap. The surgical site was irrigated with saline, dried and protected with a periodontal dressing.

Antibiotics and analgesics were prescribed for patients and they were recalled after two weeks for suture removal and clinical examination. Plaque control was reinforced at the time of suture removal. Further recalls for evaluation were scheduled at 3 months and 6 months from the time of surgery.

At each visit plaque control was reinforced and supra-gingival scaling done if required. Clinical evaluation included recording of all the clinical parameters.

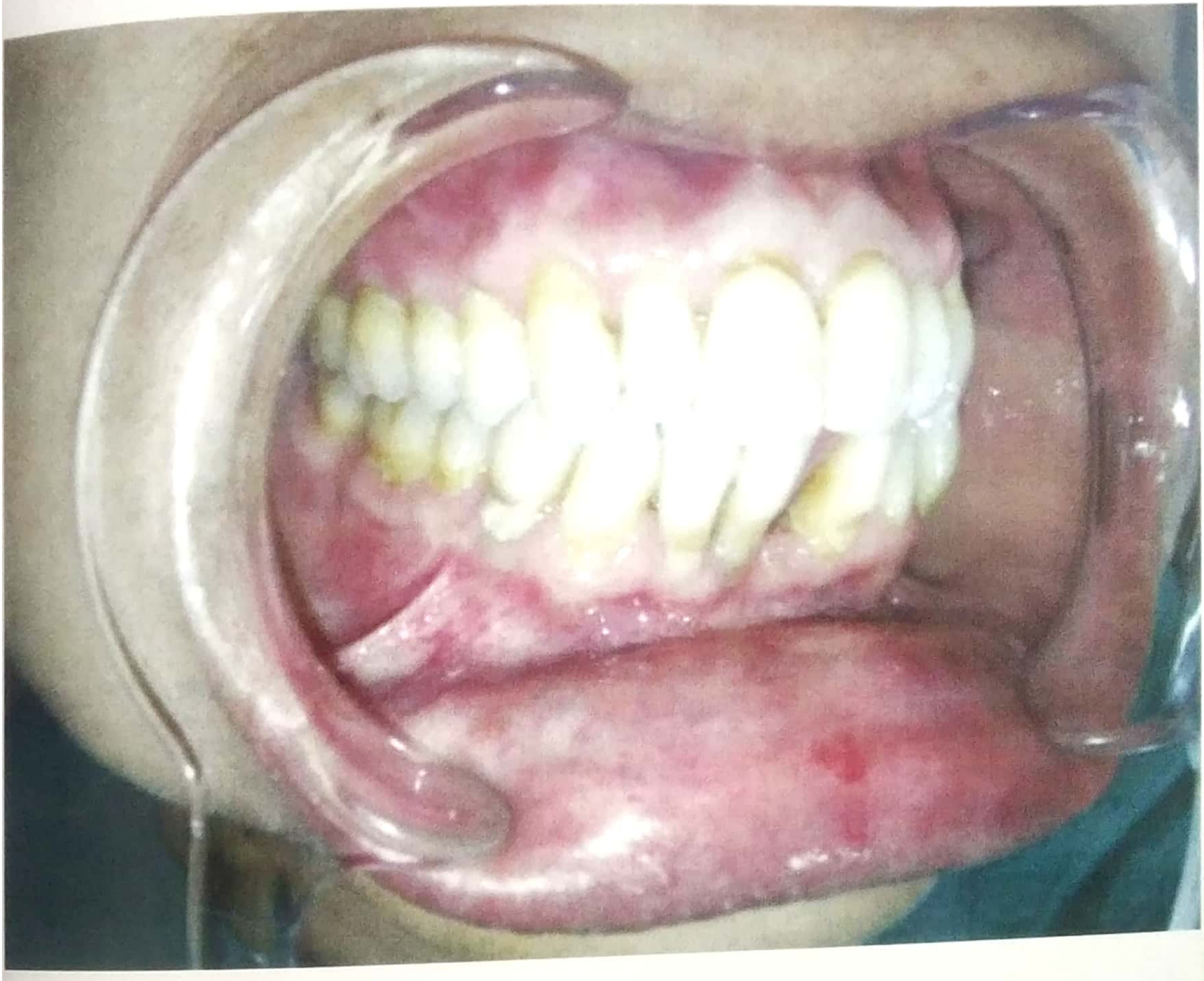
At the end of the study, the data which was collected was subjected to standard mean, variance and mean deviation and the paired t-test; these statistical analyses was carried out on SPSS 16.0 version (Chicago, Inc., USA) and interpreted for the final results.

MATERIALS: CENTRIFUGE AND SCALING INSTRUMENTS

PLATE NO. II

MATERIALS FOR SURGICAL THERAPY

PLATE NO. III



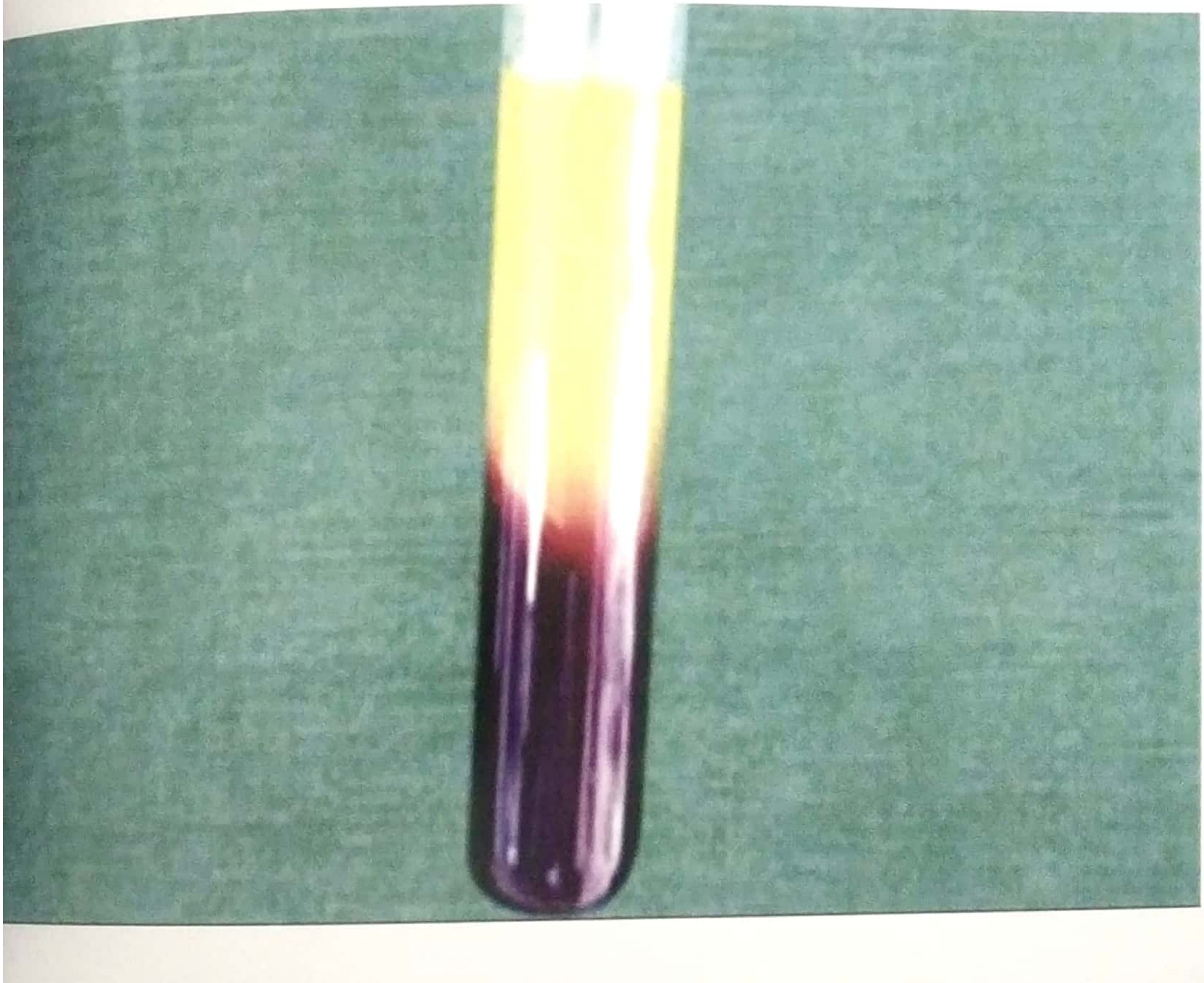
PRE OPERATIVE GINGIVAL RECESSION

PLATE NO. IV

MUCOPERIOSTEAL FLAP ELEVATED

MUCOPERIOSTEAL FLAP ELEVATED BEYOND MGJ

PLATE NO. V

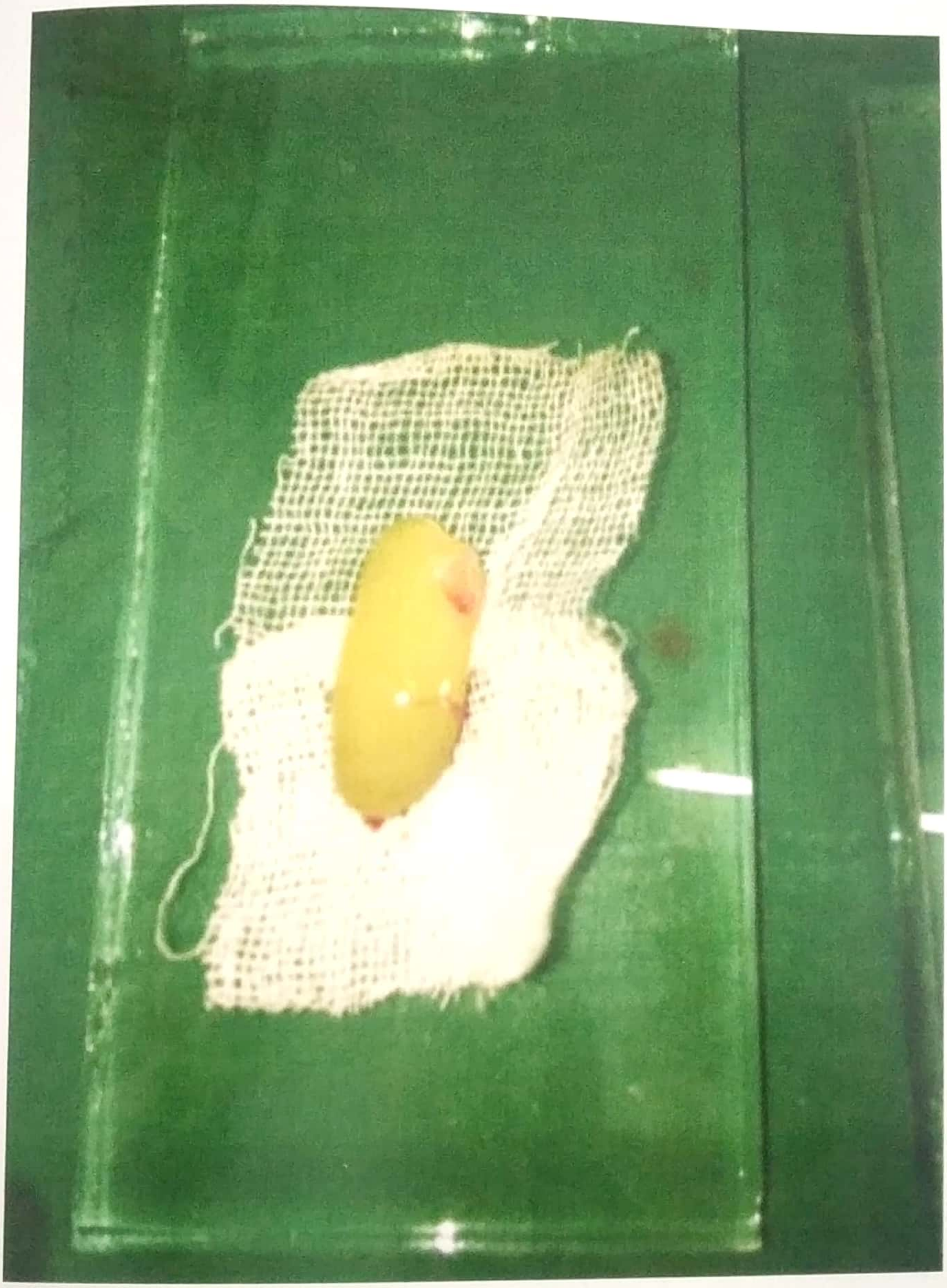


PRF OBTAINED AFTER CENTRIFUGATION

PLATE NO. VI

PRF CLOT RETRIEVAL

PLATE NO. VII



PRF OBTAINED

PLATE NO. VIII

PRF MEMBRANE PREPARATION

PLATE NO. IX

PRF PLACEMENT

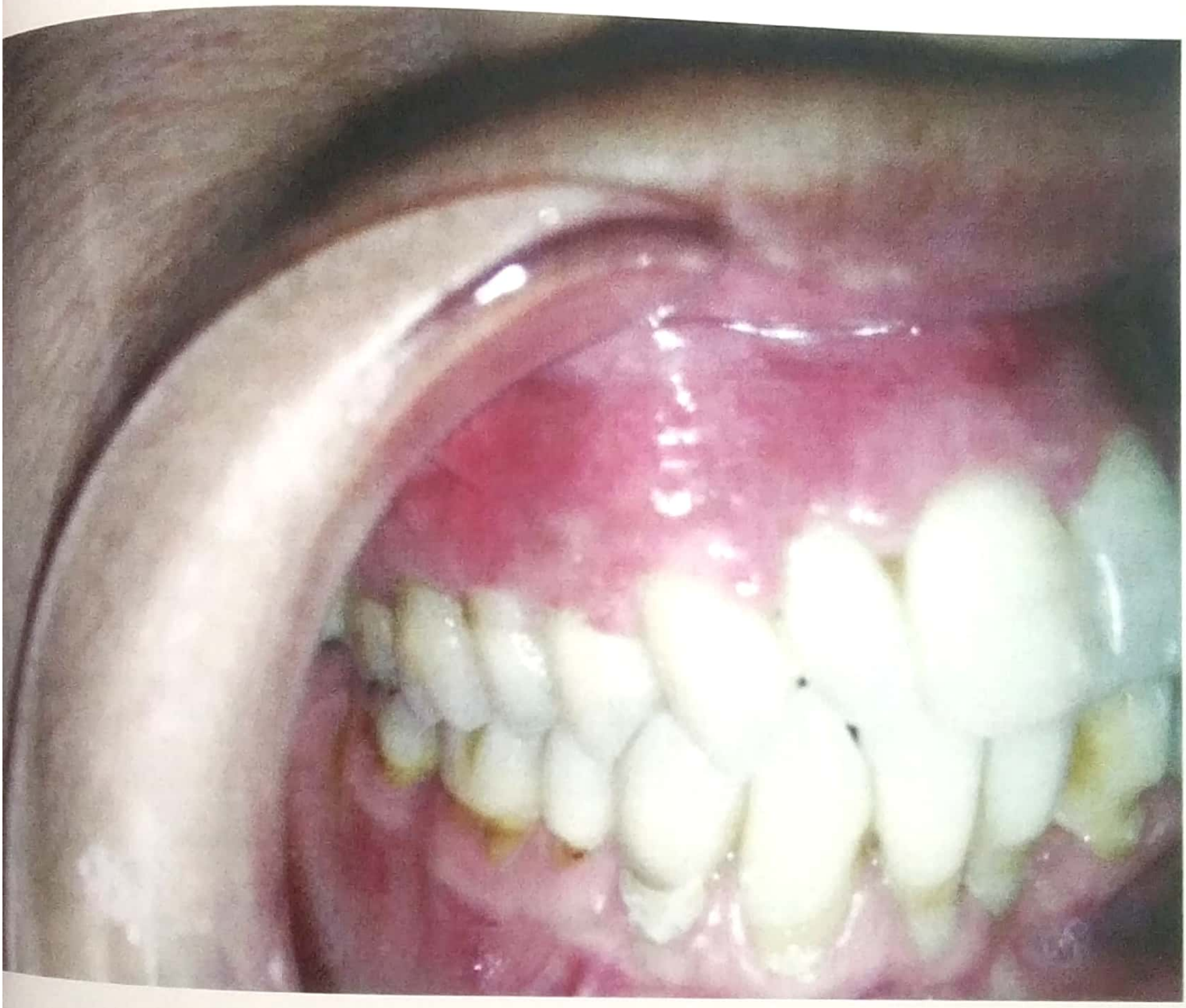
ANCHOR SUTURES PLACED

PLATE NO. X

POST OPERATIVE SUTURE REMOVAL

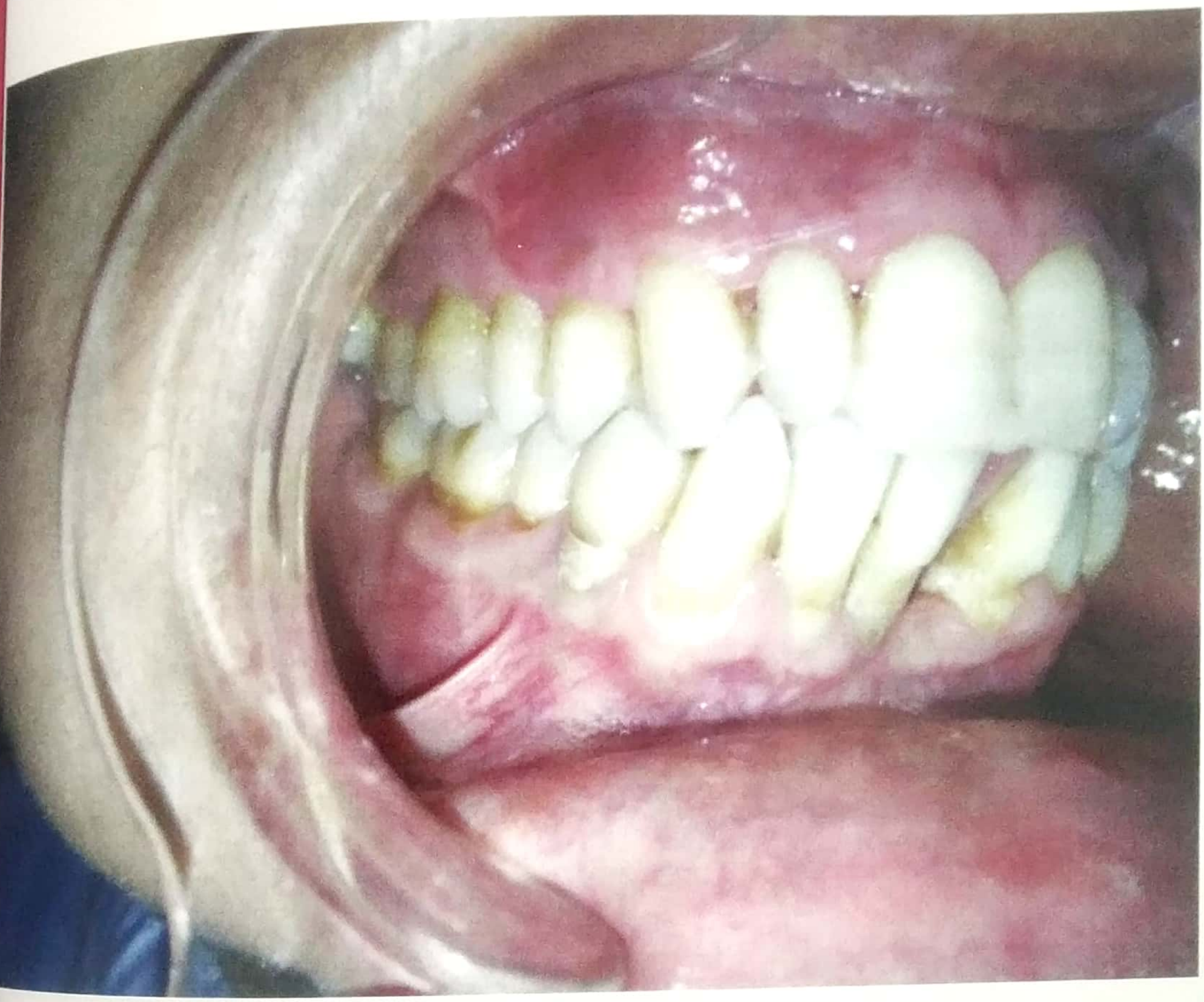
POST OPERATIVE ROOT COVERAGE PANORAMA AT 6 MONTHS

PLATE NO. XI



POST OPERATIVE AT 3 MONTHS

PLATE NO. XII



POST OPERATIVE AT 6 MONTHS

PLATE NO. XIII

REPRESENTATIVE PHOTOGRAPH OF BRACKET SUPPORTED SUTURES

REPRESENTATIVE PHOTOGRAPH OF COEPAK PLACED

PLATE NO. XIV

Results &Observations

RESULTS AND OBSERVATIONS

The present study was conducted in the Department of Periodontics, Babu Banarasi Das College of Dental Sciences (BBDCODS), Lucknow, India, with the objective to determine the prognostic outcome and accuracy after surgical treatment of gingival recessions classified under Kumar and Massamatti's classification of gingival recession. A total of 43 sites were included in this study with recession defects of Class IA and Class IIB gingival recession.

Statistical analysis

The results are presented in mean±SD. The Paired t-test was used to compare the mean change in study parameters from baseline to subsequent time periods. The p-value<0.05 was considered significant. All the analysis was carried out on SPSS 16.0 version (Chicago, Inc., USA).

The paired sample t-test is a statistical technique that is used to compare two population means in the case of two samples that are correlated. Paired sample t-test is used in 'before-after' studies, or when the samples are the matched pairs, or when it is a case-control study.

$$t=d/\sqrt{(s^2/n)}$$

where d is the mean difference between two samples, s^2 is the sample variance, n is the sample size and t is a paired sample t-test with n-1 degrees of freedom.

CLINICAL PARAMETERS:-

GINGIVAL INDEX

Distribution of GI from baseline to subsequent time periods in class IA

Table-1 & Fig. 1 shows the distribution of GI from baseline to subsequent time periods in Class IA. The mean GI was 1.63±0.65, 0.77±0.52 and 0.50±0.51 at baseline, 3 months and 6 months respectively.

In Class IA, the mean GI at baseline was 1.63±0.65 that reduced to 0.77±0.52 after 3 months, showing a reduction of 0.86±0.56 and further reduced to 0.50±0.51 after 6 months, showing a reduction of 1.13±0.35 from baseline.

The mean GI at 3 months was 0.77±0.52 that reduced to 0.50±0.51 after 6 months, showing a reduction of 0.27±0.45.

Table-1: Distribution of GI from baseline to subsequent time periods in class IA

Time periods	GI (Mean±SD)
Baseline	1.63±0.65
3 months	0.77±0.52
6 months	0.50±0.51

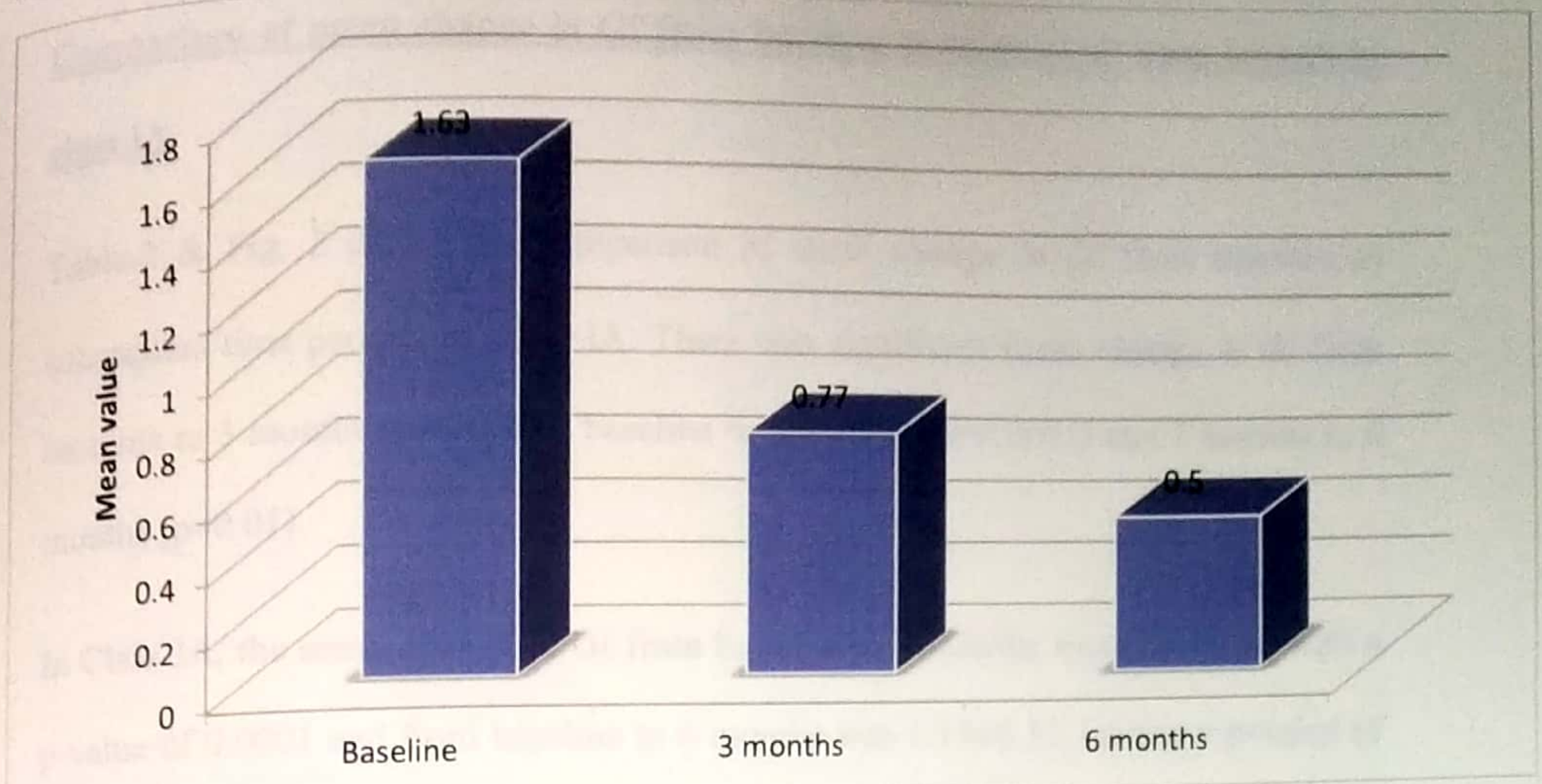


Fig. 1: Distribution of GI from baseline to subsequent time periods in class IA

Comparison of mean change in GI from baseline to subsequent time periods in class IA

Table-2 & Fig. 2 shows the comparison of mean change in GI from baseline to subsequent time periods in Class IA. There was significant mean change in GI from baseline to 3 months (p=0.0001), baseline to 6 months (p=0.0001) and 3 months to 6 months (p=0.01).

In Class IA, the mean change in GI from baseline to 3 months was 0.86±0.56 with a p-value of 0.0001 and from baseline to 6 months was 1.13±0.35, having a p-value of 0.0001 which is statistically highly significant.

The mean change in GI from 3 months to 6 months was 0.27±0.45 with a p-value of 0.01 which is statistically significant.

Table-2: Comparison of mean change in GI from baseline to subsequent time periods in class IA

Time periods	Mean change	p-value[1]
Baseline to 3 months	0.86±0.56	0.0001*
Baseline to 6 months	1.13±0.35	0.0001*
3 months to 6 months	0.27±0.45	0.01*

[1]Paired t-test, *Significant

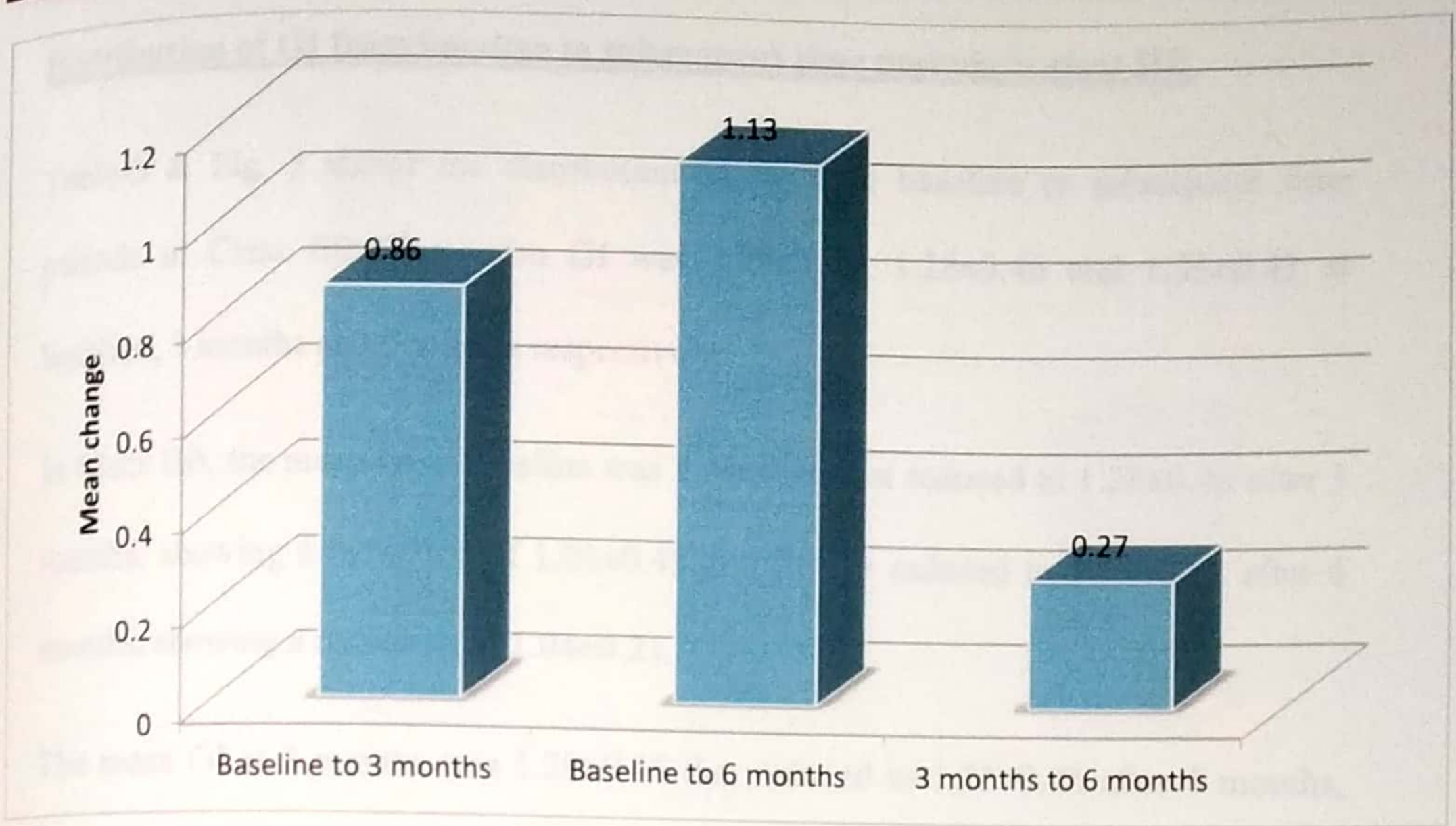


Fig. 2: Comparison of mean change in GI from baseline to subsequent time periods in class IA

Distribution of GI from baseline to subsequent time periods in class IIB

Table-3 & Fig. 3 shows the distribution of GI from baseline to subsequent time periods in Class IIB. The mean GI was 2.28±0.46, 1.28±0.46 and 1.23±0.43 at baseline, 3 months and 6 months respectively.

In Class IIB, the mean GI at baseline was 2.28±0.46 that reduced to 1.28±0.46 after 3 months, showing a reduction of 1.01±0.45 and further reduced to 1.23±0.43 after 6 months, showing a reduction of 1.04±0.21.

The mean GI at 3 months was 1.28±0.46 that reduced to 1.23±0.43 after 6 months, showing a reduction of 0.04±0.21.

Table-3: Distribution of GI from baseline to subsequent time periods in class IIB

Time periods	GI (Mean±SD)
Baseline	2.28±0.46
3 months	1.28±0.46
6 months	1.23±0.43

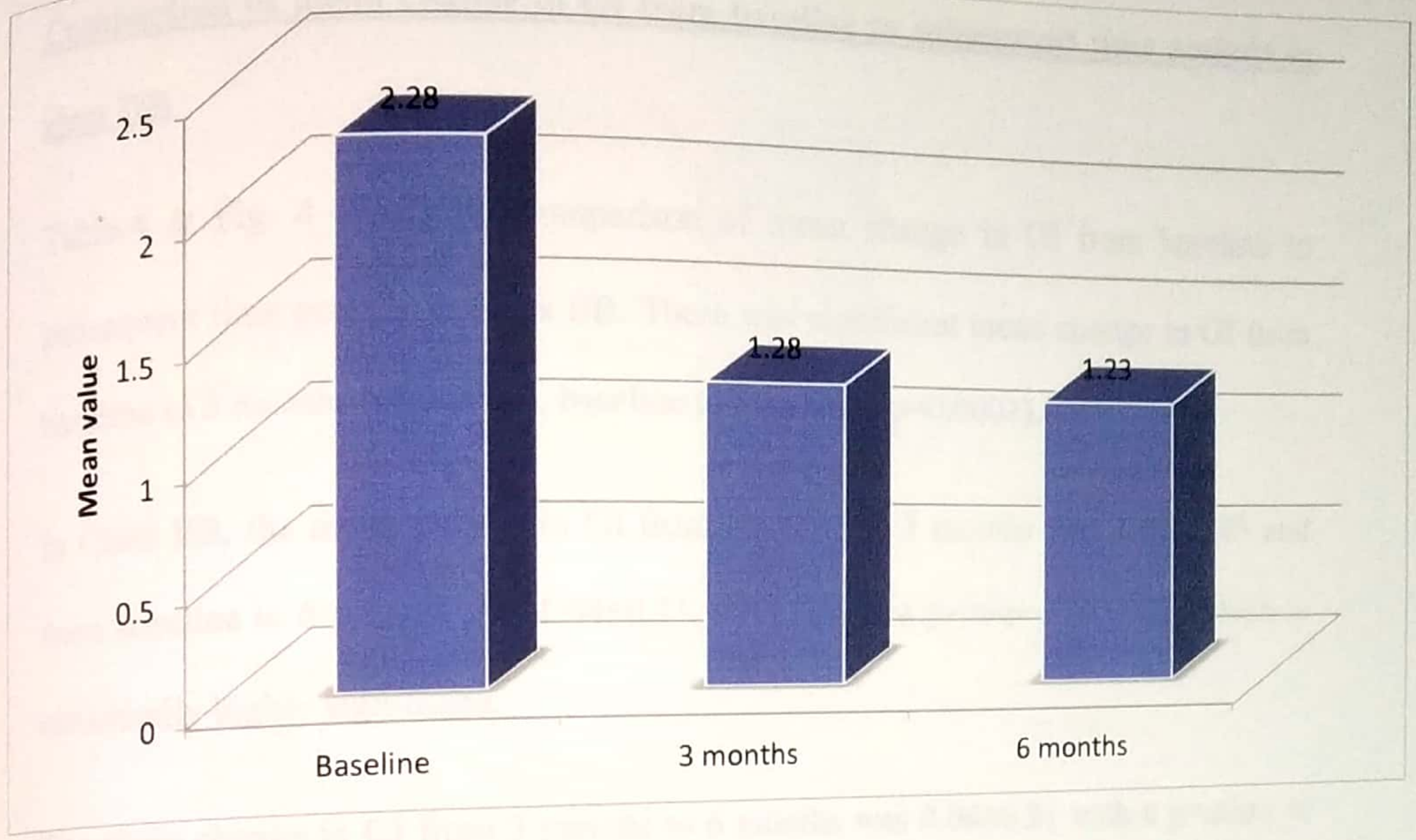


Fig. 3: Distribution of GI from baseline to subsequent time periods in class IIB

Comparison of mean change in GI from baseline to subsequent time periods in class IIB

Table-4 & Fig. 4 shows the comparison of mean change in GI from baseline to subsequent time periods in Class IIB. There was significant mean change in GI from baseline to 3 months (p=0.0001), baseline to 6 months (p=0.0001).

In Class IIB, the mean change in GI from baseline to 3 months was 1.01±0.45 and from baseline to 6 months was 1.04±0.21, both having a p-value of 0.0001, which is statistically highly significant.

The mean change in GI from 3 months to 6 months was 0.04±0.21 with a p-value of 0.32 which is statistically not significant.

Table-4: Comparison of mean change in GI from baseline to subsequent time periods in class IIB

Time periods	Mean change	p-value[1]
Baseline to 3 months	1.01±0.45	0.0001*
Baseline to 6 months	1.04±0.21	0.0001*
3 months to 6 months	0.04±0.21	0.32

[1]Paired t-test, *Significant

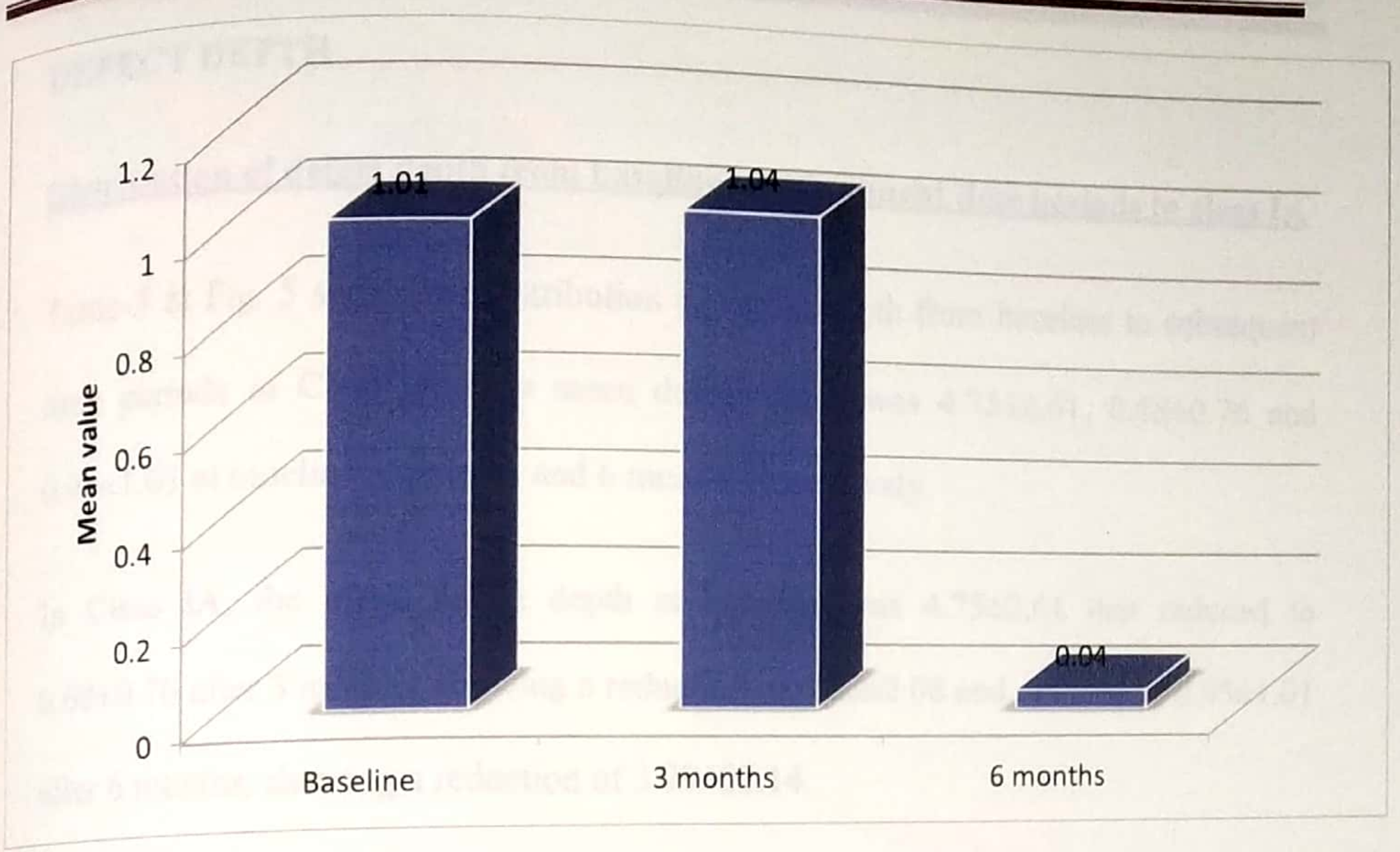


Fig. 4: Comparison of mean change in GI from baseline to subsequent time periods in class IIB

DEFECT DEPTH

Distribution of defect depth from baseline to subsequent time periods in class IA

Table-5 & Fig. 5 shows the distribution of defect depth from baseline to subsequent time periods in Class IA. The mean defect depth was 4.75±2.61, 0.68±0.76 and 0.95±1.01 at baseline, 3 months and 6 months respectively.

In Class IA, the mean defect depth at baseline was 4.75±2.61 that reduced to 0.68±0.76 after 3 months, showing a reduction of 4.06±2.08 and reduced to 0.95±1.01 after 6 months, showing a reduction of 3.79±02.14.

The mean defect depth at 3 months was 0.68±0.76 that increased to 0.95±1.01 after 6 months, showing an increase of 0.27±0.36.

Table-5: Distribution of defect depth from baseline to subsequent time periods in class IA

Time periods	Defect depth (Mean±SD)
Baseline	4.75±2.61
3 months	0.68±0.76
6 months	0.95±1.01

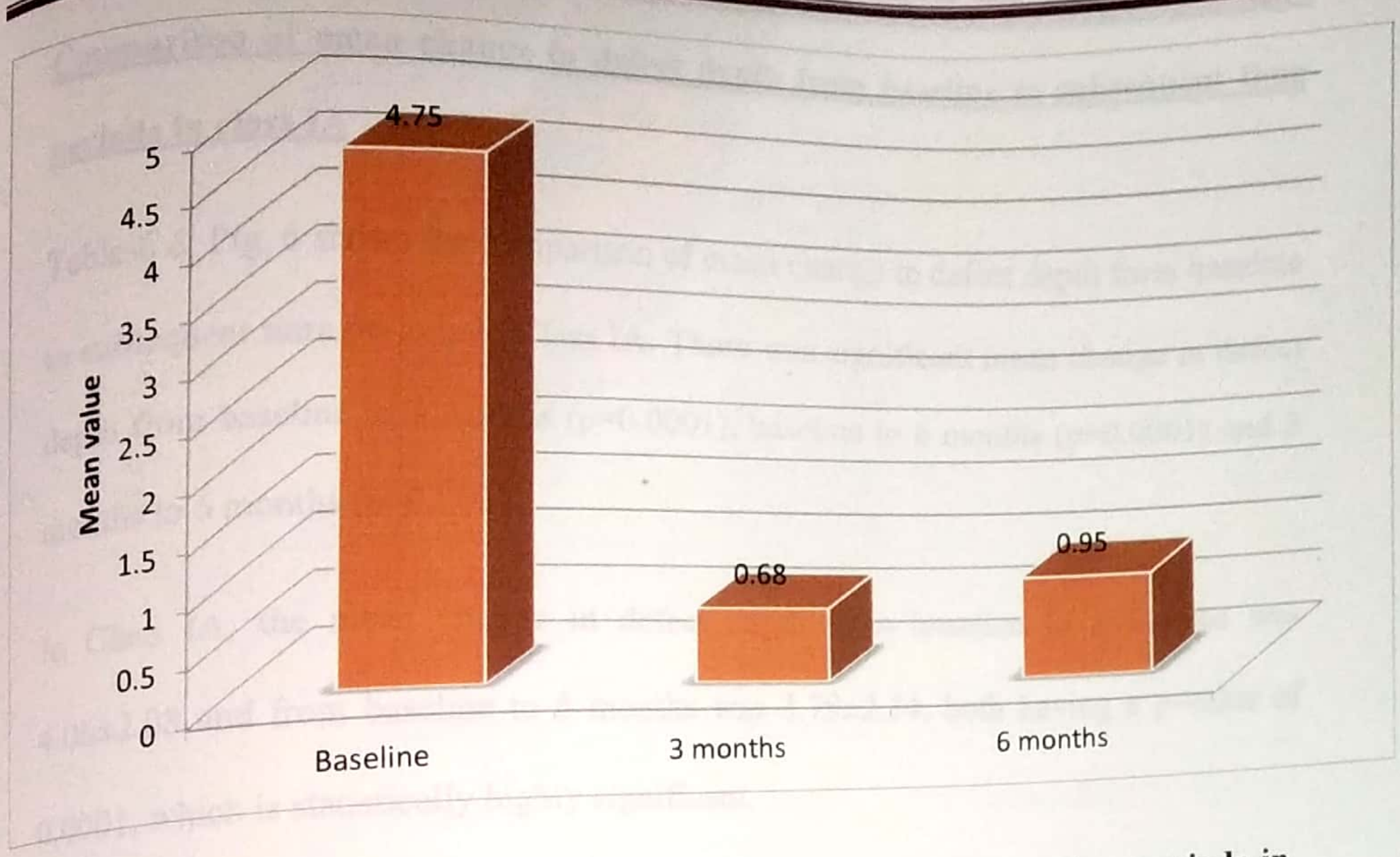


Fig. 5: Distribution of defect depth from baseline to subsequent time periods in class IA

Comparison of mean change in defect depth from baseline to subsequent time periods in class IA

Table-6 & Fig. 6 shows the comparison of mean change in defect depth from baseline to subsequent time periods in Class IA. There was significant mean change in defect depth from baseline to 3 months (p=0.0001), baseline to 6 months (p=0.0001) and 3 months to 6 months (p=0.002).

In Class IA, the mean change in defect depth from baseline to 3 months was 4.06±2.08 and from baseline to 6 months was 3.79±2.14, both having a p-value of 0.0001, which is statistically highly significant.

The mean change in defect depth from 3 months to 6 months increased by 0.27±0.36 with a p-value of 0.002 which is statistically significant.

Table-6: Comparison of mean change in defect depth from baseline to subsequent time periods in class IA

Time periods	Mean change	p-value[1]
Baseline to 3 months	4.06±2.08	0.0001*
Baseline to 6 months	3.79±2.14	0.0001*
3 months to 6 months	-0.27±0.36	0.002*

[1]Paired t-test, *Significant

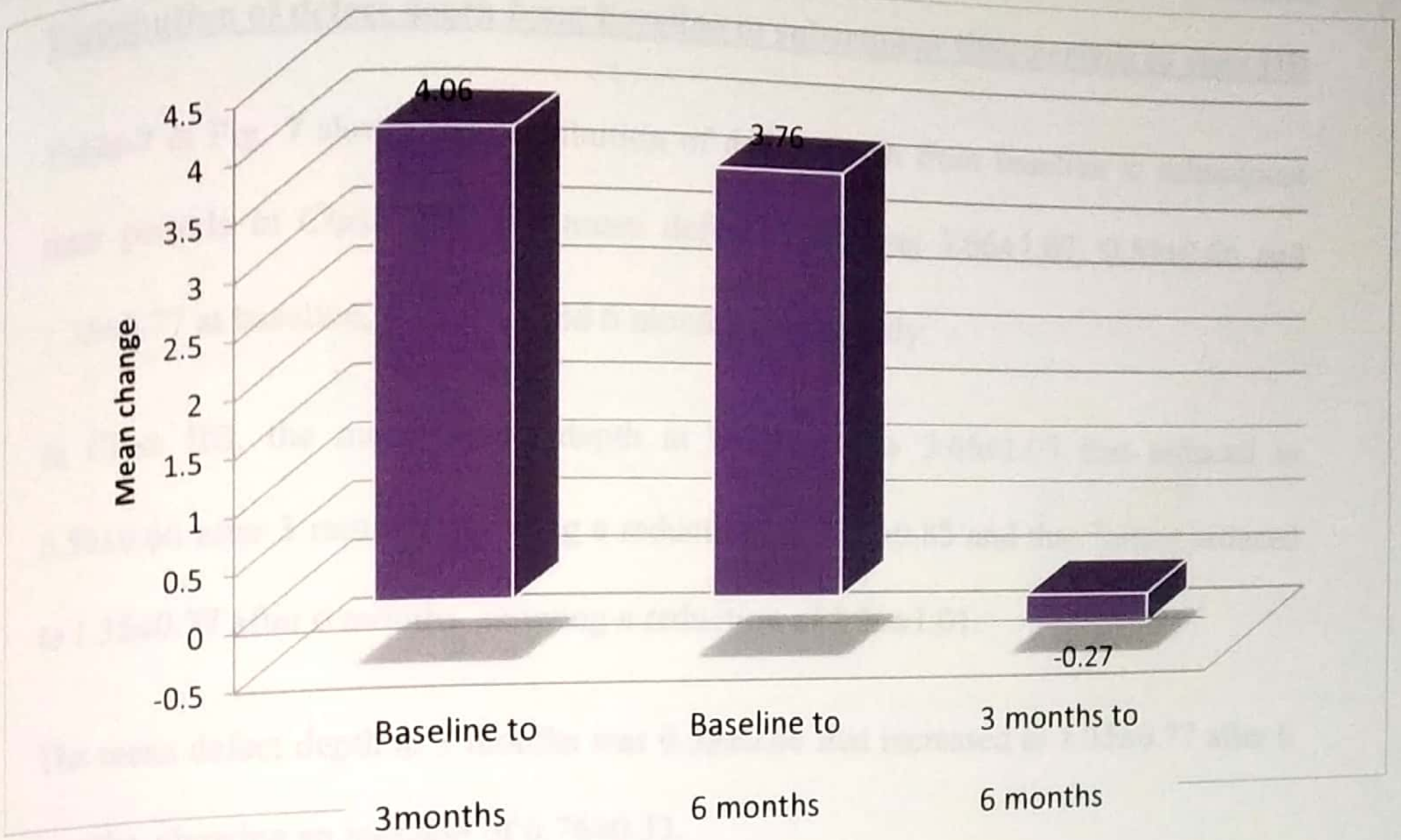


Fig. 6: Comparison of mean change in defect depth from baseline to subsequent time periods in class IA

Distribution of defect depth from baseline to subsequent time periods in class IIB

Table-7 & Fig. 7 shows the distribution of defect depth from baseline to subsequent time periods in Class IIB. The mean defect depth was 3.66±1.07, 0.59±0.66 and 1.35±0.77 at baseline, 3 months and 6 months respectively.

In Class IIB, the mean defect depth at baseline was 3.66±1.07 that reduced to 0.59±0.66 after 3 months, showing a reduction of 3.07±0.85 and that further reduced to 1.35±0.77 after 6 months, showing a reduction of 2.30±1.01.

The mean defect depth at 3 months was 0.59±0.66 that increased to 1.35±0.77 after 6 months, showing an increase of 0.76±0.33.

Table-7: Distribution of defect depth from baseline to subsequent time periods in class IIB

Time periods	**Defect depth (Mean±SD)**
Baseline	3.66±1.07
3 months	0.59±0.66
6 months	1.35±0.77

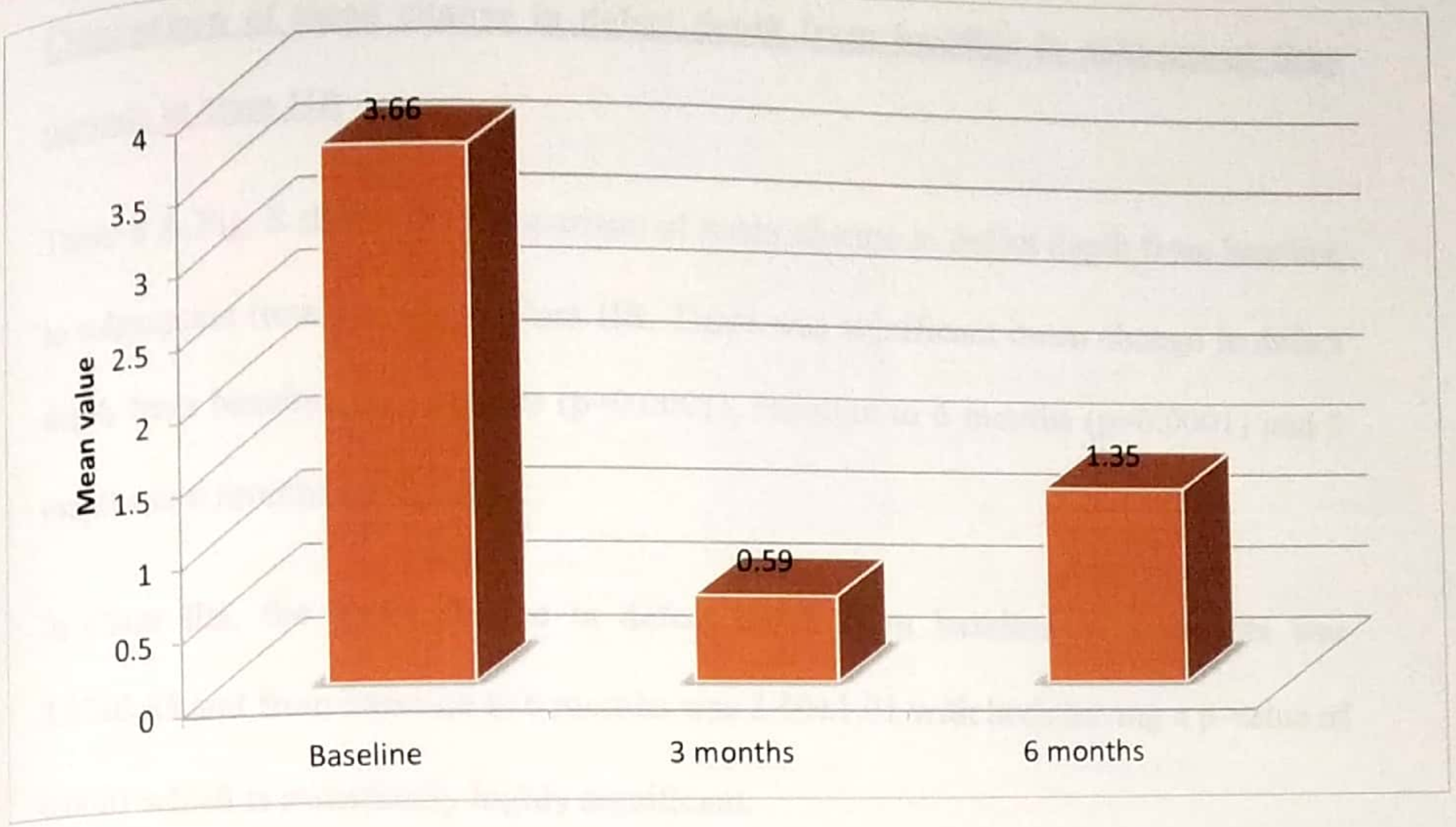


Fig. 7: Distribution of defect depth from baseline to subsequent time periods in class IIB

Comparison of mean change in defect depth from baseline to subsequent time periods in class IIB

Table-8 & Fig. 8 shows the comparison of mean change in defect depth from baseline to subsequent time periods in Class IIB. There was significant mean change in defect depth from baseline to 3 months (p=0.0001), baseline to 6 months (p=0.0001) and 3 months to 6 months (p=0.0001).

In Class IIB, the mean change in defect depth from baseline to 3 months was 3.07±0.85 and from baseline to 6 months was 2.30±1.01 with both having a p-value of 0.0001 which is statistically highly significant.

The mean change in defect depth from 3 months to 6 months increased by 0.76±0.33 with a p-value of 0.0001 which is statistically highly significant.

Table-8: Comparison of mean change in defect depth from baseline to subsequent time periods in class IIB

Time periods	Mean change	p-value[1]
Baseline to 3 months	3.07±0.85	0.0001*
Baseline to 6 months	2.30±1.01	0.0001*
3 months to 6 months	-0.76±0.33	0.0001*

[1]Paired t-test, *Significant

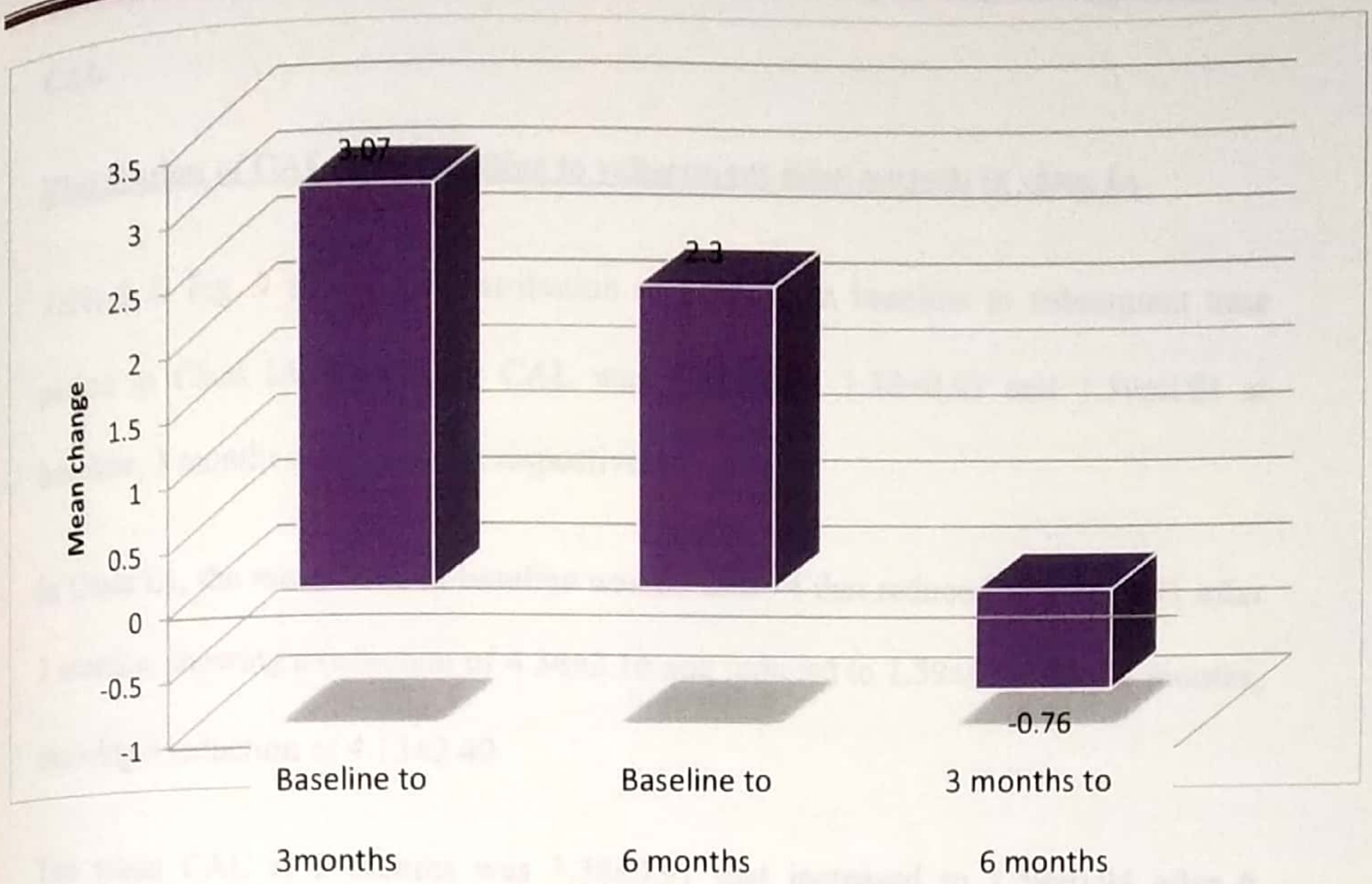


Fig. 8: Comparison of mean change in defect depth from baseline to subsequent time periods in class IIB

CAL

Distribution of CAL from baseline to subsequent time periods in class IA

Table-9 & Fig. 9 shows the distribution of CAL from baseline to subsequent time period in Class IA. The mean CAL was 5.72±2.74, 1.38±0.91 and 1.59±0.94 at baseline, 3 months and 6 months respectively.

In Class IA, the mean CAL at baseline was 5.72±2.74 that reduced to 1.38±0.91 after 3 months, showing a reduction of 4.34±2.16 and reduced to 1.59±0.94 after 6 months, showing a reduction of 4.13±2.40.

The mean CAL at 3 months was 1.38±0.91 that increased to 1.59±0.94 after 6 months, showing an increase of 0.20±0.45.

Table-9: Distribution of CAL from baseline to subsequent time periods in class IA

Time periods	CAL (Mean±SD)
Baseline	5.72±2.74
3 months	1.38±0.91
6 months	1.59±0.94

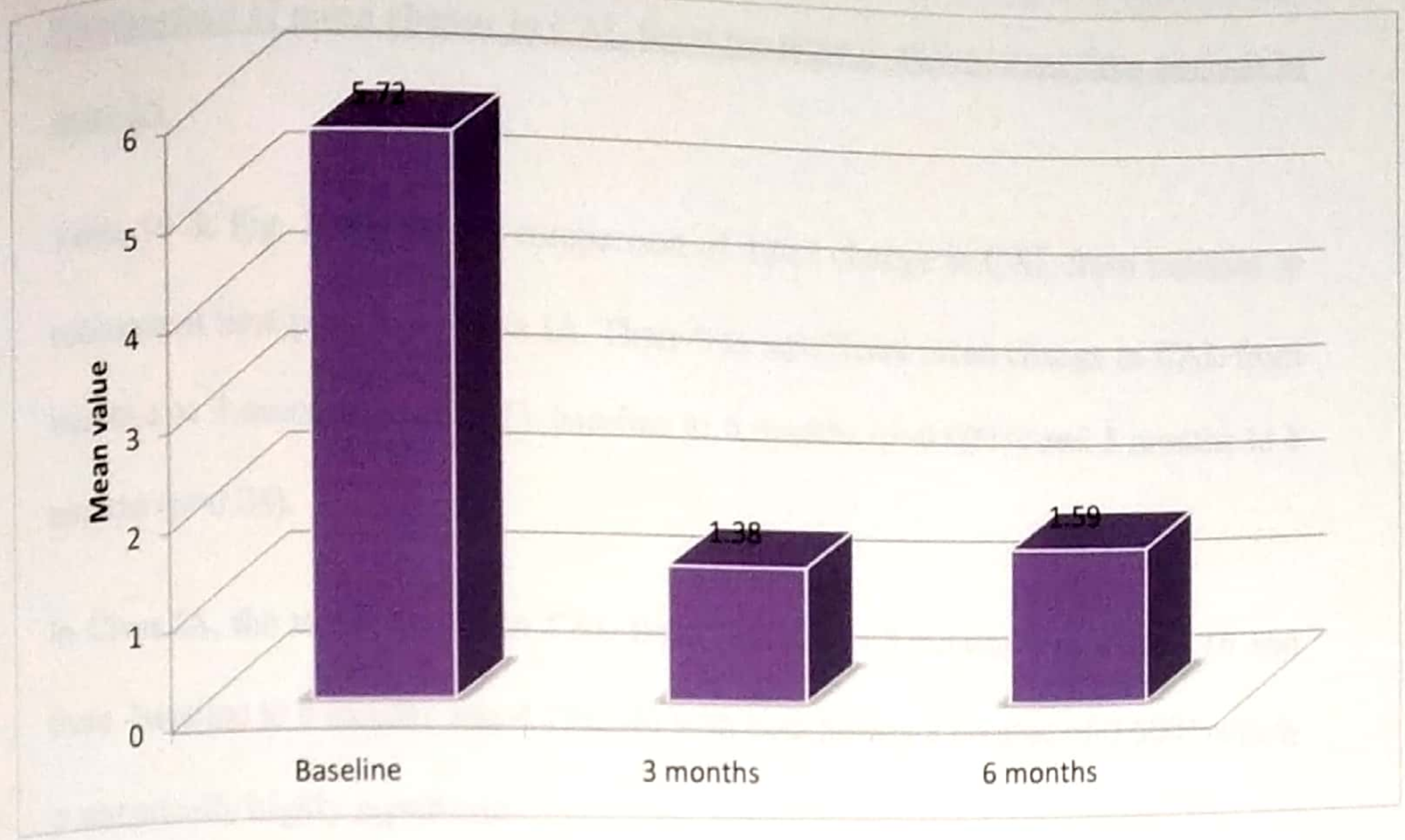


Fig. 9: Distribution of CAL from baseline to subsequent time periods in class IA

Comparison of mean change in CAL from baseline to subsequent time periods in class IA

Table-10 & Fig. 10 shows the comparison of mean change in CAL from baseline to subsequent time periods in Class IA. There was significant mean change in CAL from baseline to 3 months (p=0.0001), baseline to 6 months (p=0.0001) and 3 months to 6 months (p=0.04).

In Class IA, the mean change in CAL from baseline to 3 months was 4.34±2.16 and from baseline to 6 months was 4.13±2.40 with both having a p-value of 0.0001 which is statistically highly significant.

The mean change in CAL from 3 months to 6 months showed an increase by 0.20±0.45 with a p-value of 0.04 which is statistically not significant.

Table-10: Comparison of mean change in CAL from baseline to subsequent time periods in class IA

Time periods	Mean change	p-value[1]
Baseline to 3 months	4.34±2.16	0.0001*
Baseline to 6 months	4.13±2.40	0.0001*
3 months to 6 months	-0.20±0.45	0.04*

[1]Paired t-test, *Significant

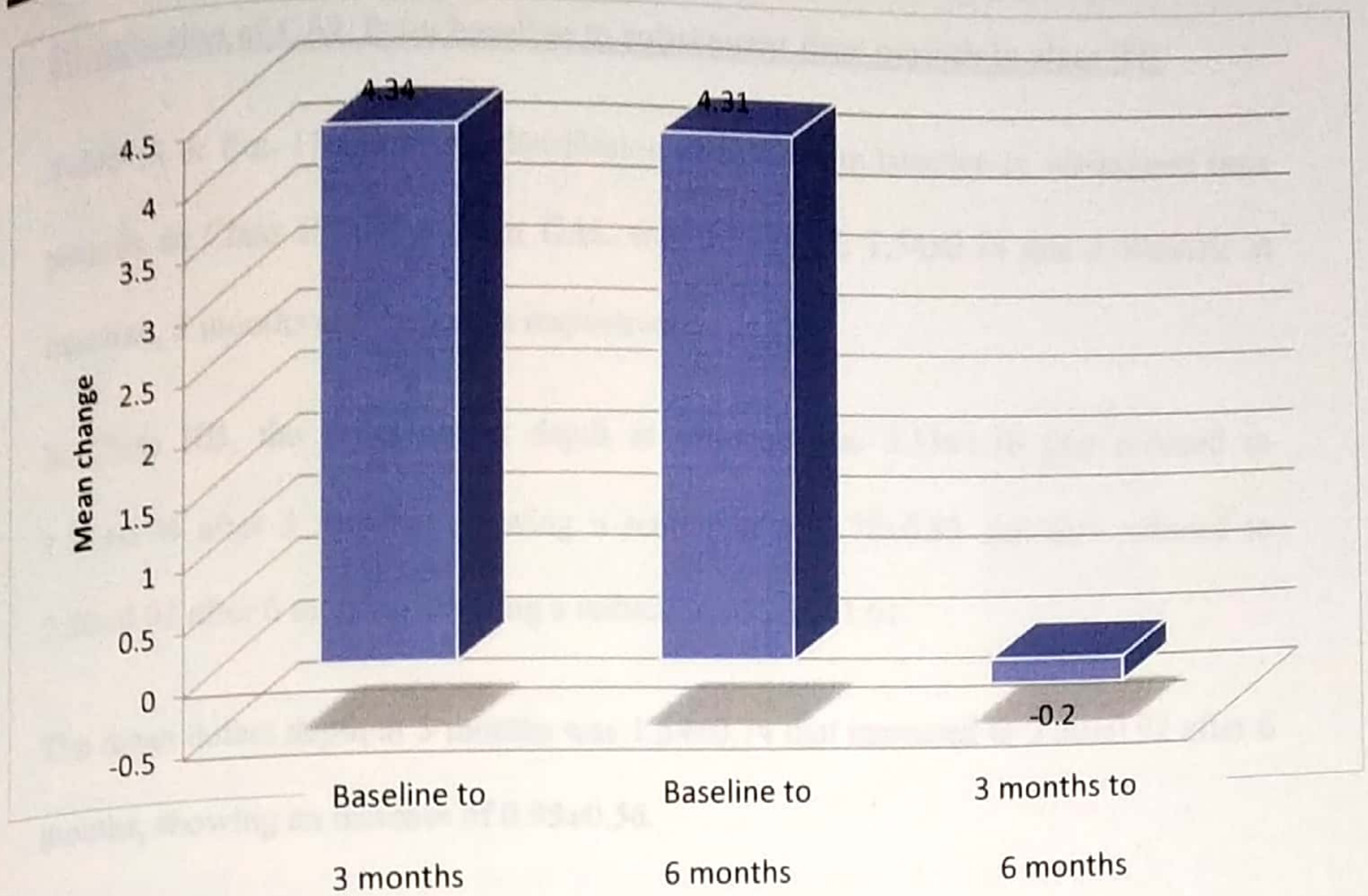


Fig. 10: Comparison of mean change in CAL from baseline to subsequent time periods in class IA

Distribution of CAL from baseline to subsequent time periods in class IIB

Table-11 & Fig. 11 shows the distribution of CAL from baseline to subsequent time periods in Class IIB. The mean CAL was 5.33±1.16, 1.54±0.74 and 2.50±0.92 at baseline, 3 months and 6 months respectively.

In Class IIB, the mean defect depth at baseline was 5.33±1.16 that reduced to 1.54±0.74 after 3 months, showing a reduction of 3.78±0.83 and that reduced to 2.50±0.92 after 6 months, showing a reduction of 2.83±1.01.

The mean defect depth at 3 months was 1.54±0.74 that increased to 2.50±0.92 after 6 months, showing an increase of 0.95±0.56.

Table-11: Distribution of CAL from baseline to subsequent time periods in class IIB

Time periods	**CAL (Mean±SD)**
Baseline	5.33±1.16
3 months	1.54±0.74
6 months	2.50±0.92

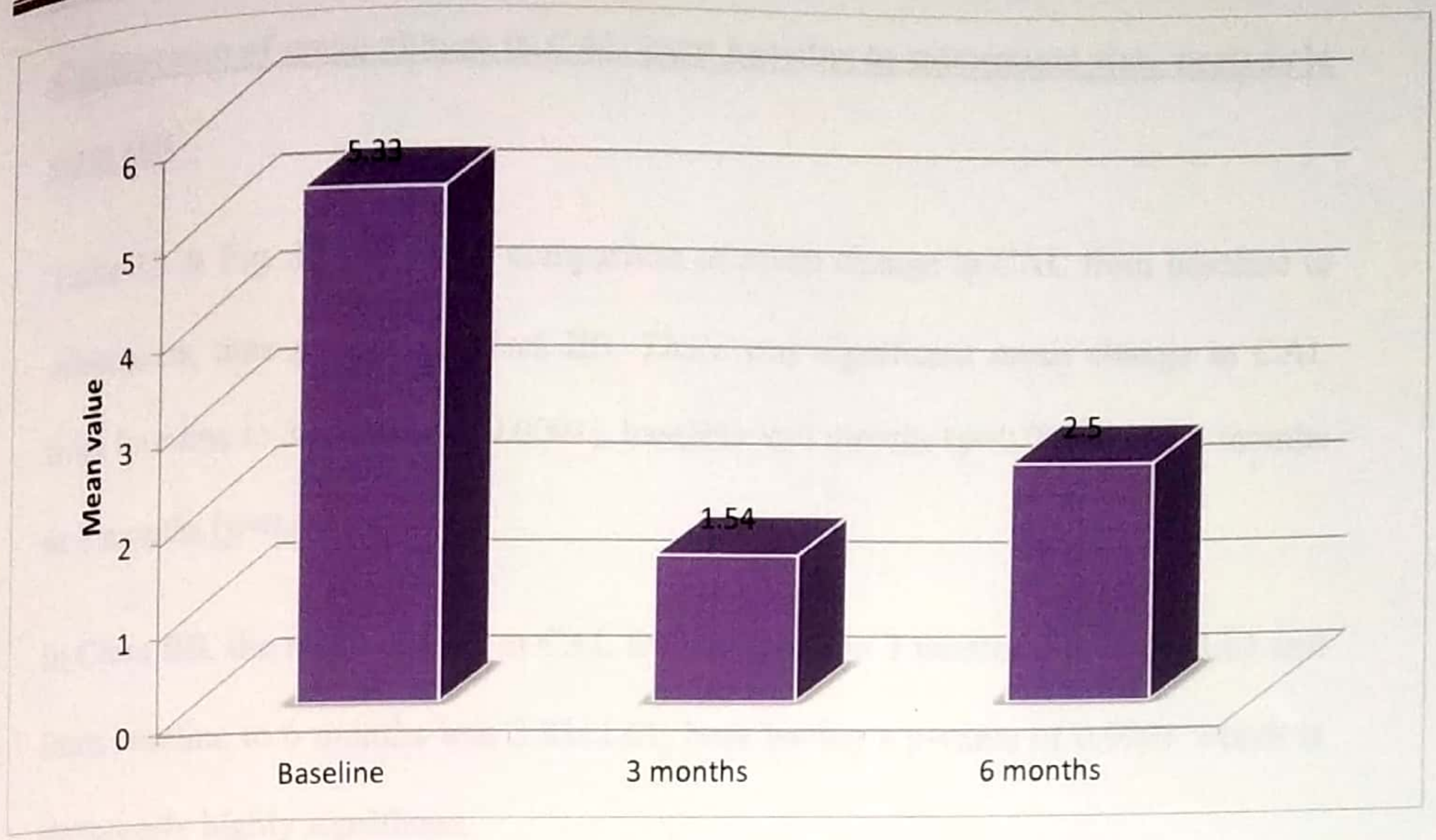


Fig. 11: Distribution of CAL from baseline to subsequent time periods in class IIB

Comparison of mean change in CAL from baseline to subsequent time periods in class IIB

Table-12 & Fig. 12 shows the comparison of mean change in CAL from baseline to subsequent time periods in Class IIB. There was significant mean change in CAL from baseline to 3 months (p=0.0001), baseline to 6 months (p=0.0001) and 3 months to 6 months (p=0.0001).

In Class IIB, the mean change in CAL from baseline to 3 months was 3.78±0.83 and from baseline to 6 months was 2.83±1.01, both having a p-value of 0.0001 which is statistically highly significant.

The mean change in CAL from 3 months to 6 months showed an increase by 0.95±0.56 with a p-value of 0.0001 which is statistically highly significant.

Table-12: Comparison of mean change in CAL from baseline to subsequent time periods in class IIB

Time periods	Mean change	p-value[1]
Baseline to 3 months	3.78±0.83	0.0001*
Baseline to 6 months	2.83±1.01	0.0001*
3 months to 6 months	-0.95±0.56	0.0001*

[1]Paired t-test, *Significant

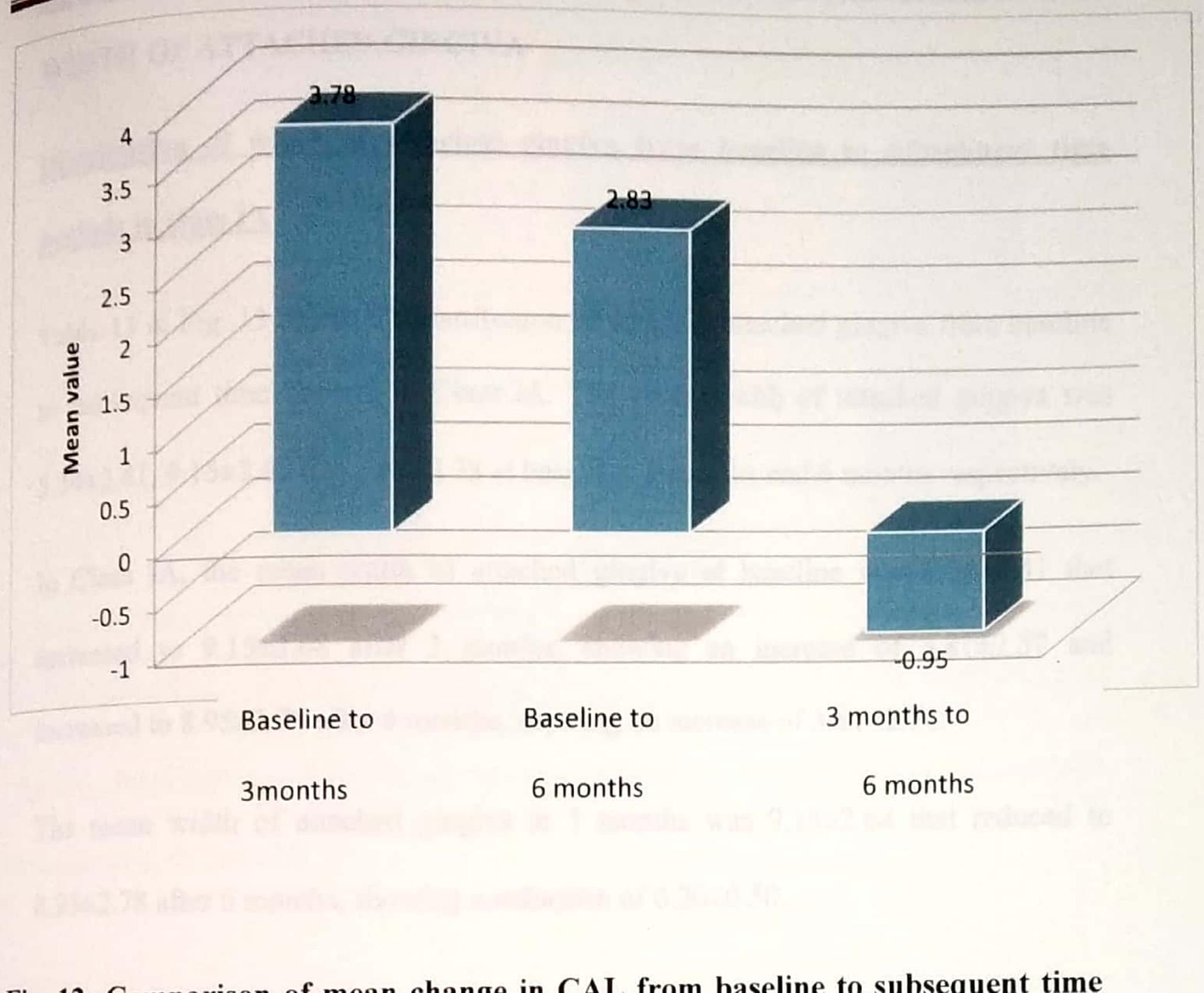


Fig. 12: Comparison of mean change in CAL from baseline to subsequent time periods in class IIB

WIDTH OF ATTACHED GINGIVA

Distribution of width of attached gingiva from baseline to subsequent time periods in class IA

Table-13 & Fig. 13 shows the distribution of width of attached gingiva from baseline to subsequent time periods in Class IA. The mean width of attached gingiva was 5.34±2.41, 9.15±2.68 and 8.95±2.78 at baseline, 3 months and 6 months respectively.

In Class IA, the mean width of attached gingiva at baseline was 5.34±2.41 that increased to 9.15±2.68 after 3 months, showing an increase of 3.81±2.57 and increased to 8.95±2.78 after 6 months, showing an increase of 3.61±2.74.

The mean width of attached gingiva at 3 months was 9.15±2.68 that reduced to 8.95±2.78 after 6 months, showing a reduction of 0.20±0.50.

Table-13: Distribution of width of attached gingiva from baseline to subsequent time periods in class IA

Time periods	Width of attached gingiva (Mean±SD)
Baseline	5.34±2.41
3 months	9.15±2.68
6 months	8.95±2.78

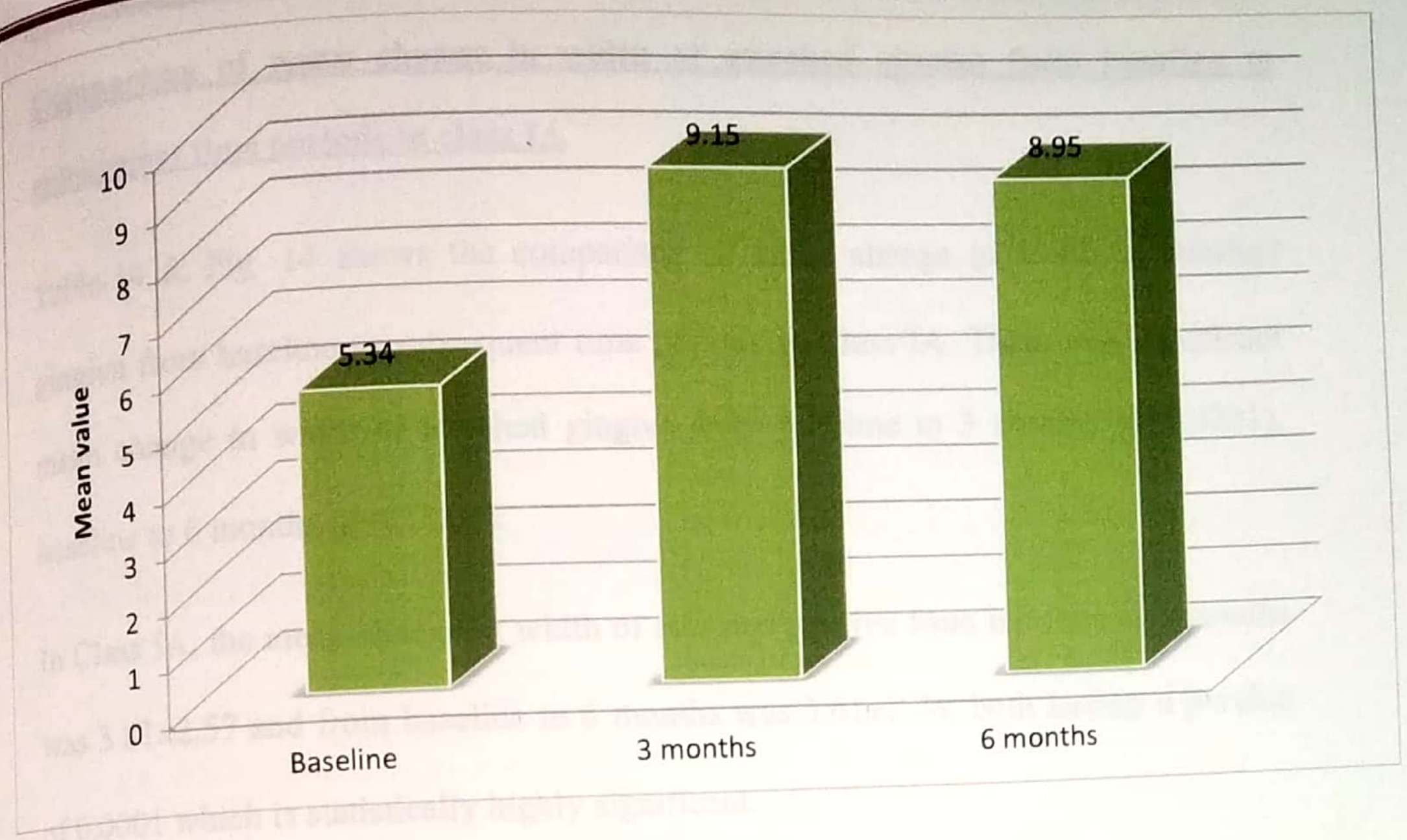


Fig. 13: Distribution of width of attached gingiva from baseline to subsequent time periods in class IA

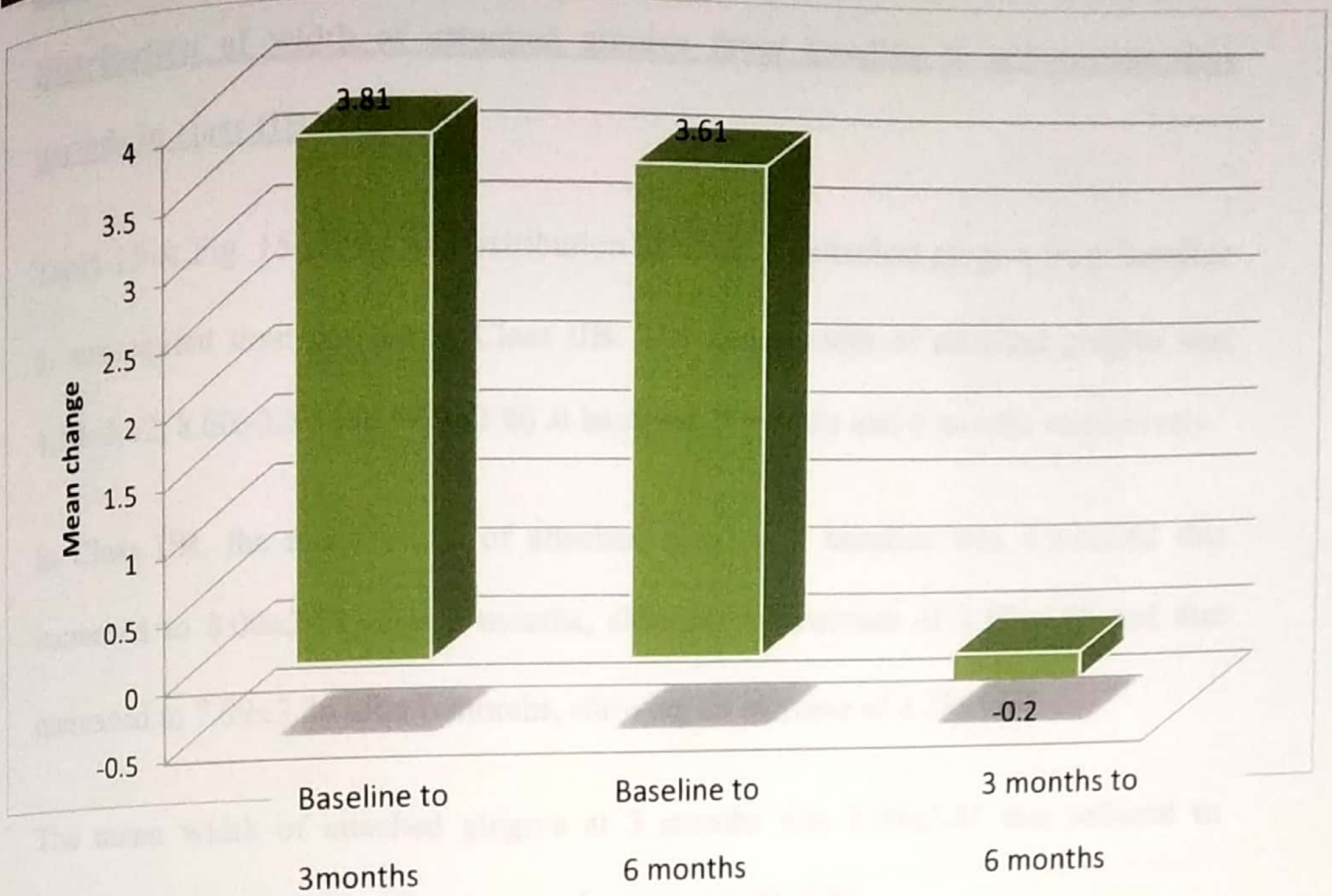


Fig. 14: Comparison of mean change in width of attached gingiva from baseline to subsequent time periods in class IA

Distribution of width of attached gingiva from baseline to subsequent time periods in class IIB

Table-15 & Fig. 15 shows the distribution of width of attached gingiva from baseline to subsequent time periods in Class IIB. The mean width of attached gingiva was 4.30±2.62, 8.00±2.51 and 7.09±2.86 at baseline, 3 months and 6 months respectively.

In Class IIB, the mean width of attached gingiva at baseline was 4.30±2.62 that increased to 8.00±2.51 after 3 months, showing an increase of 3.69±0.95 and that increased to 7.09±2.86 after 6 months, showing an increase of 2.78±1.17.

The mean width of attached gingiva at 3 months was 8.00±2.51 that reduced to 7.09±2.86 after 6 months, showing a reduction of 0.90±0.80.

Table-15: Distribution of width of attached gingiva from baseline to subsequent time periods in class IIB

Time periods	Width of attached gingiva (Mean±SD)
Baseline	4.30±2.62
3 months	8.00±2.51
6 months	7.09±2.86

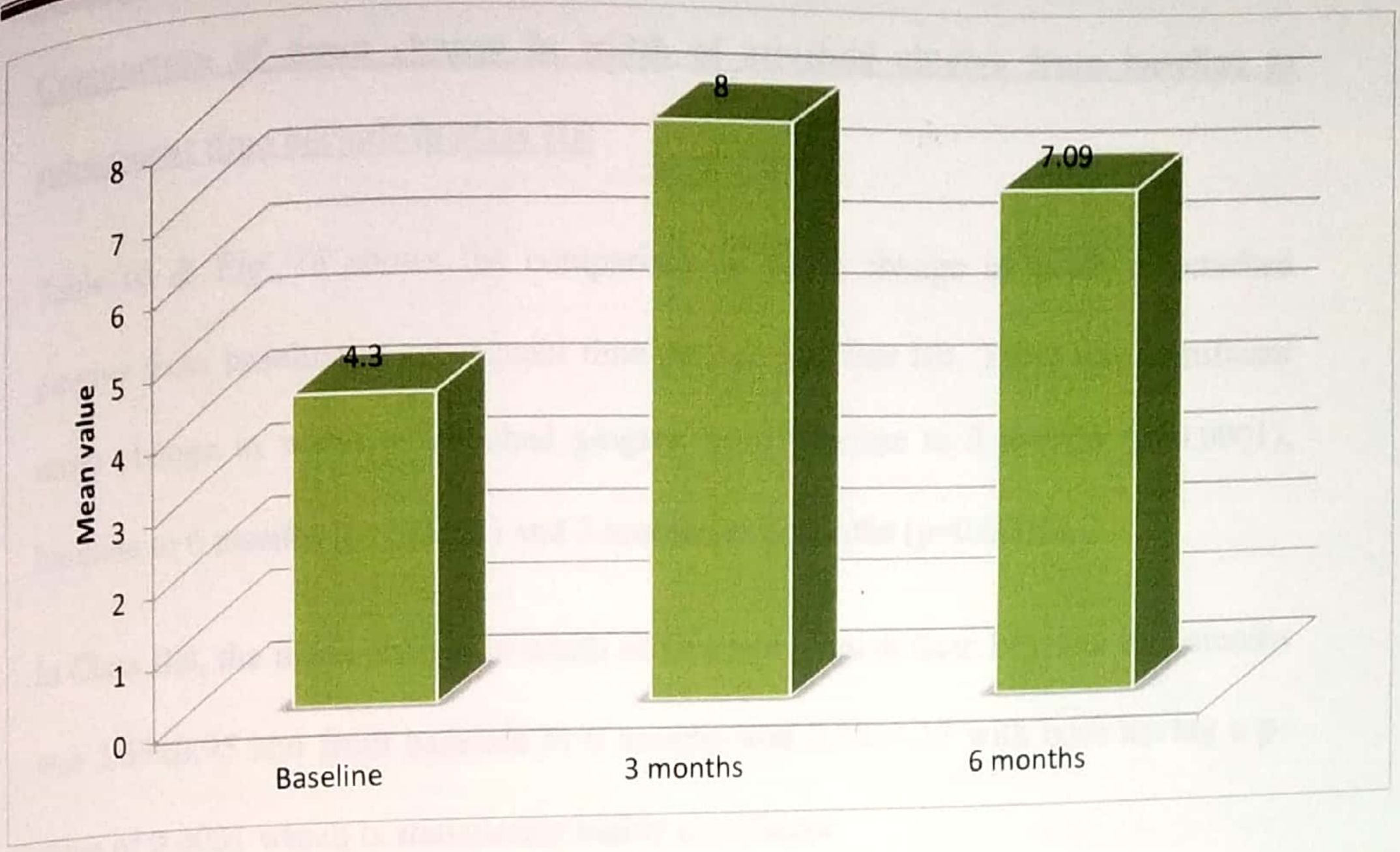


Fig. 15: Distribution of width of attached gingiva from baseline to subsequent time periods in class IIB

Comparison of mean change in width of attached gingiva from baseline to subsequent time periods in class IIB

Table-16 & Fig. 16 shows the comparison of mean change in width of attached gingiva from baseline to subsequent time periods in Class IIB. There was significant mean change in width of attached gingiva from baseline to 3 months (p=0.0001), baseline to 6 months (p=0.0001) and 3 months to 6 months (p=0.0001).

In Class IIB, the mean change in width of attached gingiva from baseline to 3 months was 3.69±0.95 and from baseline to 6 months was 2.78±1.17 with both having a p-value of 0.0001 which is statistically highly significant.

In Class IIB, the mean change in width of attached gingiva from 3 months to 6 months showed a reduction by 0.90±0.80 with a p-value of 0.0001 which is statistically highly significant.

Table-16: Comparison of mean change in width of attached gingiva from baseline to subsequent time periods in class IIB

Time periods	Mean change	p-value[1]
Baseline to 3 months	3.69±0.95	0.0001*
Baseline to 6 months	2.78±1.17	0.0001*
3 months to 6 months	-0.90±0.80	0.0001*

[1]Paired t-test, *Significant

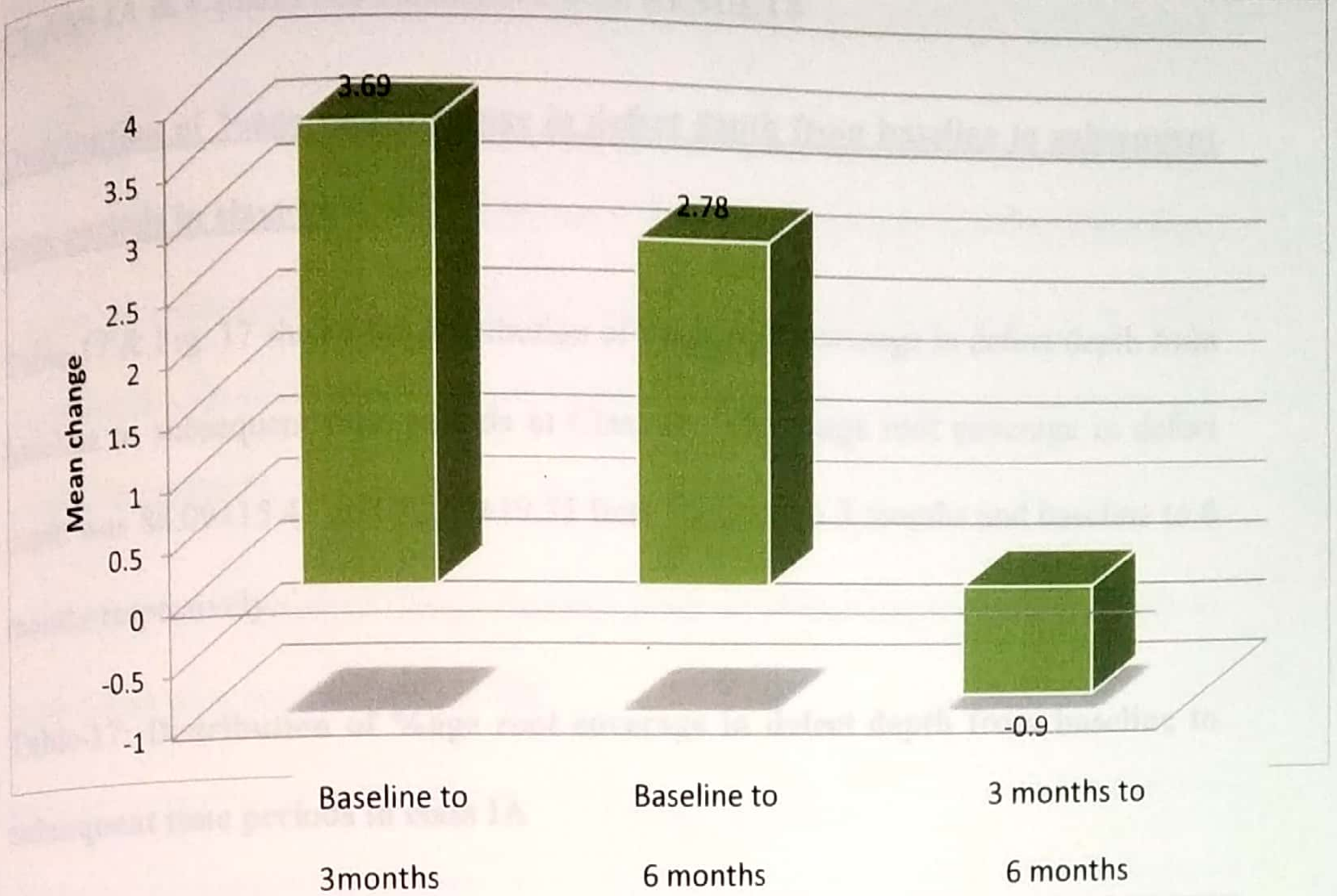


Fig. 16: Comparison of mean change in width of attached gingiva from baseline to subsequent time periods in class IIB

CLASS IA & CLASS IIB PERCENTAGE RESULTS

Distribution of %age root coverage in defect depth from baseline to subsequent time periods in class IA

Table-17 & Fig. 17 shows the distribution of %age root coverage in defect depth from baseline to subsequent time periods in Class IA. The %age root coverage in defect depth was 88.09±15.41 and 82.65±19.35 from baseline to 3 months and baseline to 6 months respectively.

Table-17: Distribution of %age root coverage in defect depth from baseline to subsequent time periods in class IA

Time periods	%age coverage
Baseline to 3 months	88.09±15.41
Baseline to 6 months	82.65±19.35

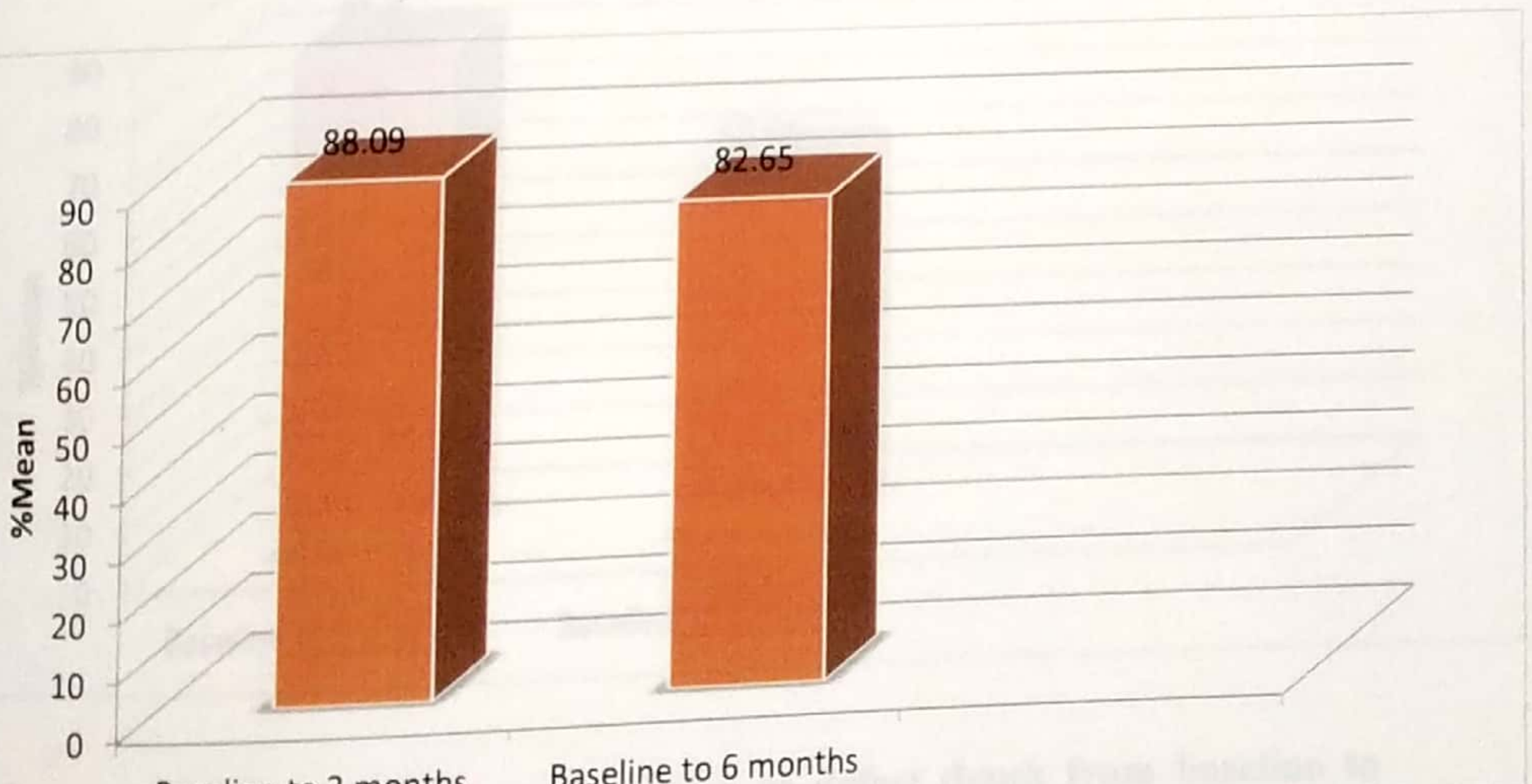


Fig. 17: Distribution of %age root coverage in defect depth from baseline to subsequent time periods in class IA

Distribution of %age root coverage in defect depth from baseline to subsequent time periods in class IIB

Table-18 & Fig. 18 shows the distribution of %age root coverage in defect depth from baseline to subsequent time periods in Class IIB. The %age root coverage in defect depth was 85.80±16.56 and 62.61±19.44 from baseline to 3 months and baseline to 6 months respectively.

Table-18: Distribution of %age root coverage in defect depth from baseline to subsequent time periods in class IIB

Time periods	%age coverage
Baseline to 3 months	85.80±16.56
Baseline to 6 months	62.61±19.44

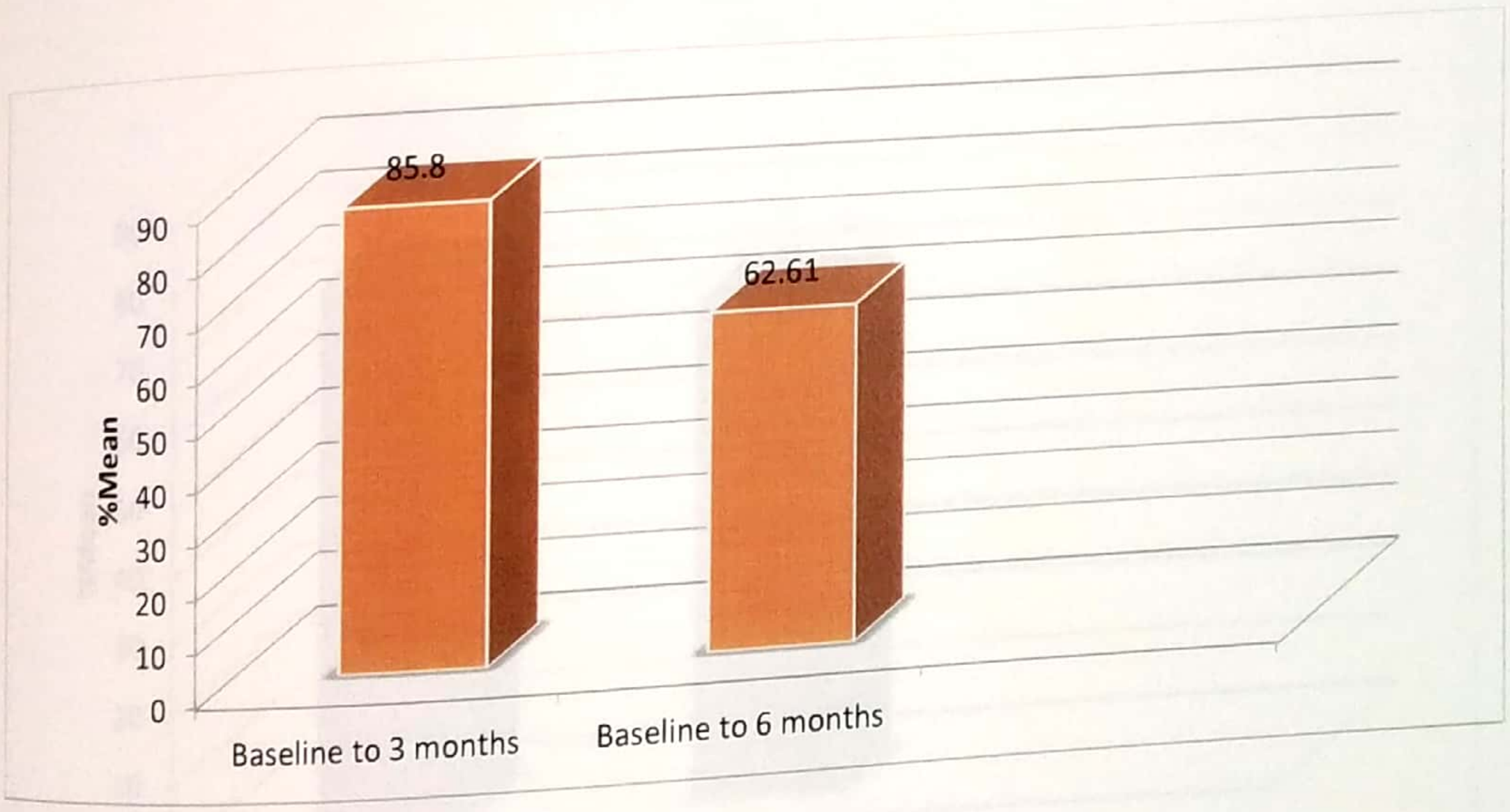


Fig. 18: Distribution of %age root coverage in defect depth from baseline to subsequent time periods in class IIB

Distribution of %age of gain in CAL from baseline to subsequent time periods in class IA

Table-19 & Fig. 19 shows the distribution of %age of gain in CAL from baseline to subsequent time periods in Class IA. The %age root coverage in CAL was 76.22±11.74 and 70.81±16.70 from baseline to 3 months and baseline to 6 months respectively.

Table-19: Distribution of %age of gain in CAL from baseline to subsequent time periods in class IA

Time periods	%age gain
Baseline to 3 months	76.22±11.74
Baseline to 6 months	70.81±16.70

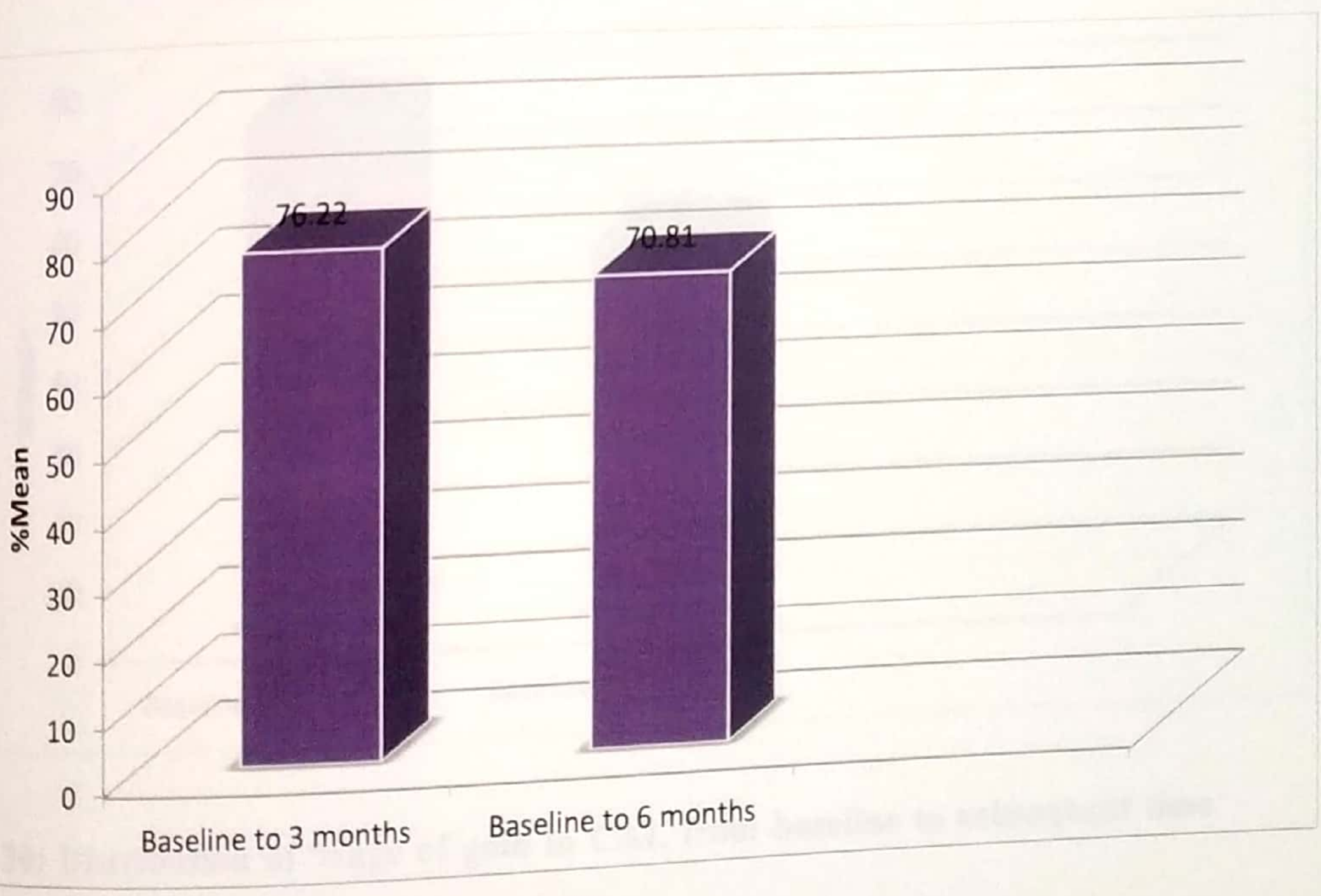


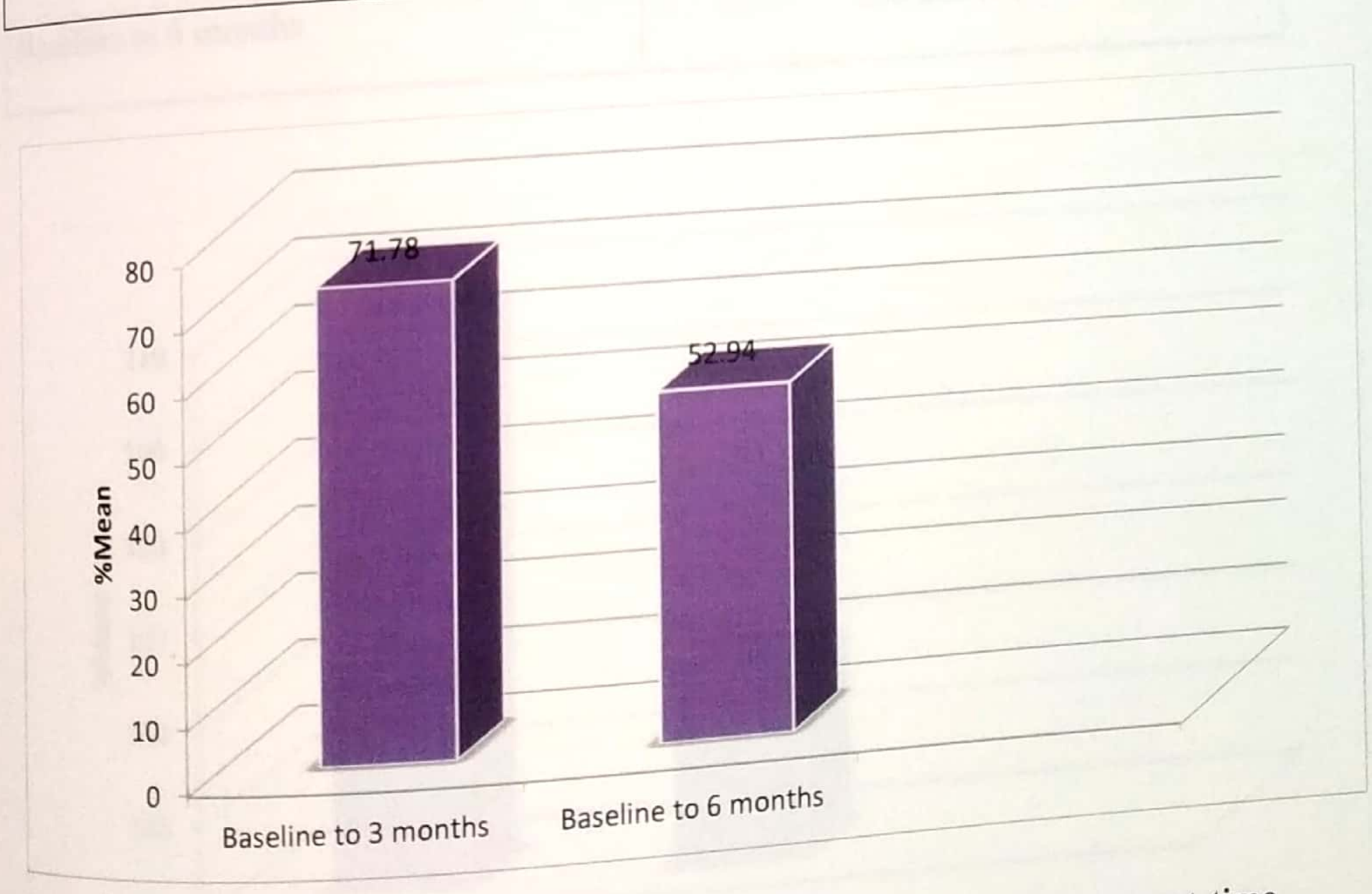
Fig.19: Distribution of %age of gain in CAL from baseline to subsequent time periods in class IA

Distribution of %age of gain in CAL from baseline to subsequent time periods in class IIB

Table-20 & Fig. 20 shows the distribution of %age of gain in CAL from baseline to subsequent time periods in Class IIB. The %age of gain in CAL was 71.78±10.41 and 52.94±13.10 from baseline to 3 months and baseline to 6 months respectively.

Table-20: Distribution of %age of gain in CAL from baseline to subsequent time periods in class IIB

Time periods	%age gain
Baseline to 3 months	71.78±10.41
Baseline to 6 months	52.94±13.10



Fig, 20: Distribution of %age of gain in CAL from baseline to subsequent time periods in class IIB

Distribution of %age of gain in width of attached gingiva from baseline to subsequent time periods in class IA

Table-21 & Fig. 21 shows the distribution of %age of gain in width of attached gingiva from baseline to subsequent time periods in Class IA. The %age root coverage in width of attached gingiva was 109.80±126.63 and 106.04±130.65 from baseline to 3 months and baseline to 6 months respectively.

Table-21: Distribution of %age of gain in width of attached gingiva from baseline to subsequent time periods in class IA

Time periods	%age coverage
Baseline to 3 months	109.80±126.63
Baseline to 6 months	106.04±130.65

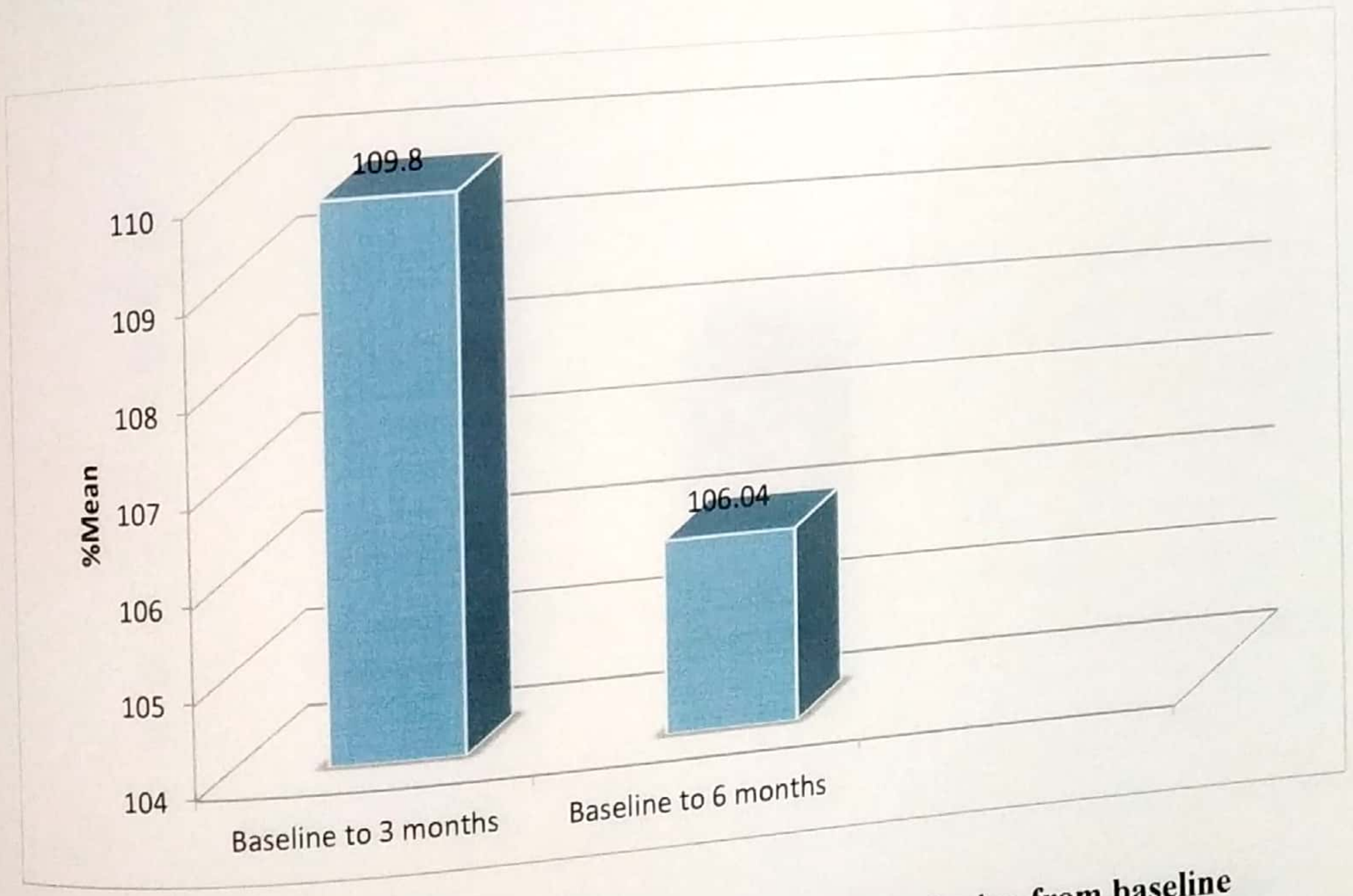


Fig. 21: Distribution of %age of gain in width of attached gingiva from baseline to subsequent time periods in class IA

Distribution of %age of gain in width of attached gingiva from baseline to subsequent time periods in class IIB

Table-22 & Fig. 22 shows the distribution of %age of gain in width of attached gingiva from baseline to subsequent time periods in Class IIB. The %age of gain in width of attached gingiva was 162.66±195.62 and 120.83±167.97 from baseline to 3 months and baseline to 6 months respectively.

Table-22: Distribution of %age of gain in width of attached gingiva from baseline to subsequent time periods in class IIB

Time periods	%age gain
Baseline to 3 months	162.66±195.62
Baseline to 6 months	120.83±167.97

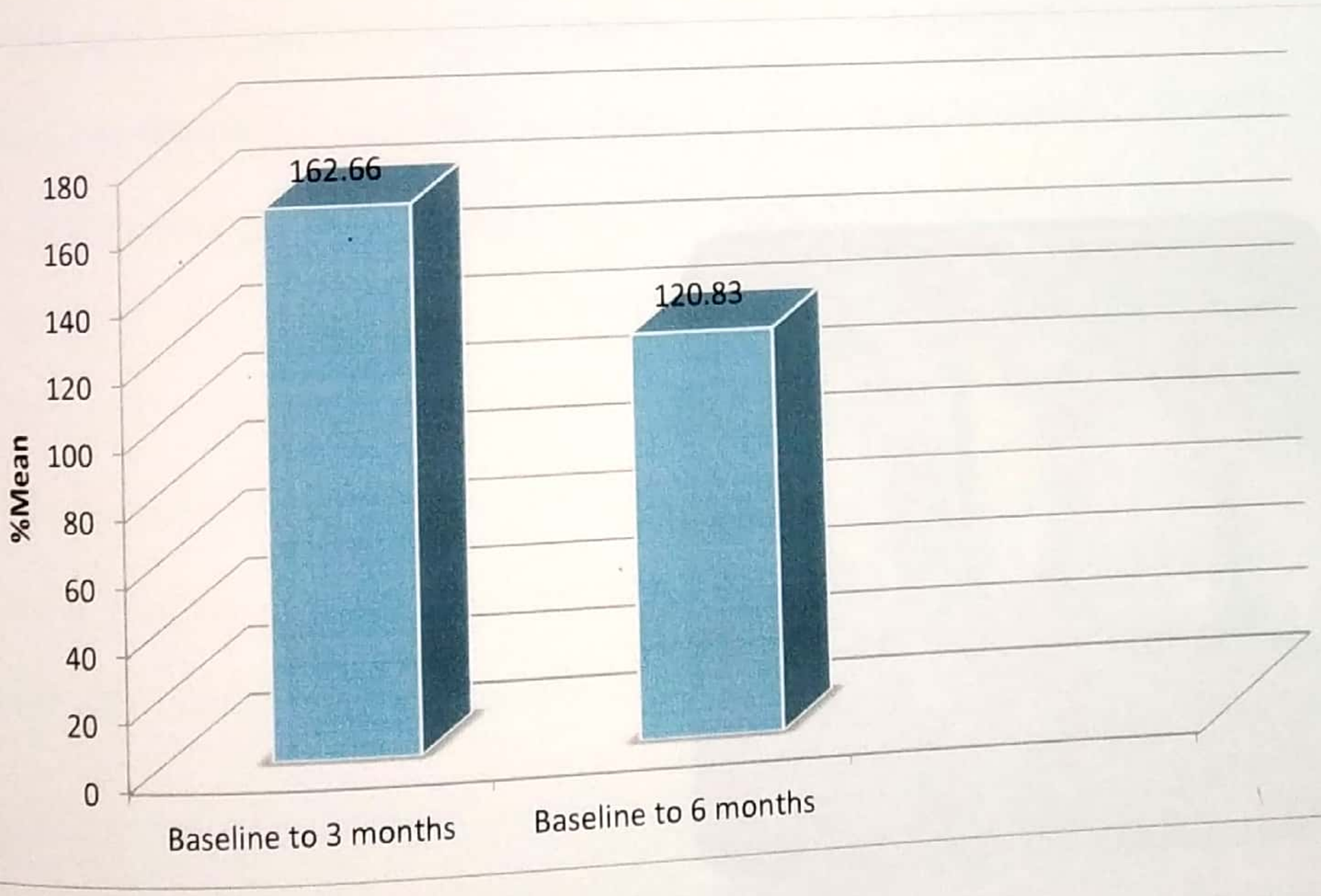


Fig. 22: Distribution of %age of gain in width of attached gingiva from baseline to subsequent time periods in class IIB

Discussion

DISCUSSION

Gingival recession is defined as "the displacement of marginal tissue apical to the cemento-enamel junction (CEJ)."[1]

Classification has been defined as "systematic arrangements in groups or categories according to established criteria'' (Merriam-Webster 2010). Classifications have been proven to be useful and indispensible tools in many and varied fields of knowledge, particularly in the field of medicine. In the specialised field of periodontology, classifications are widely used to categorize defects due to periodontitis according to their aetiology, diagnosis, treatment and prognosis aiding in a wholistic and comprehensive approach when evaluating the condition the patient presents with. Gingival recessions (GR) are frequent clinical findings and due to their aesthetic presentation patients tend to request for treatment. In order to facilitate diagnosis many classifications have been proposed for GR as early as 1968 by Sullivan and Atkins. They classified recessions into narrow, wide, deep and shallow.[4] Mlinek et al in 1973 expanded this classification of shallow – narrow cleft as being < 3mm in both dimensions and deep – wide defects as being > 3mm in both dimensions.[51] In 1980 Liu and Solt classified marginal tissue recession based on a visual aspect, ie measured from CEJ to soft tissue margin and a hidden aspect, ie loss of attachment within the pocket that is apical to tissue margin. Their focus being more on attachment loss than visible recession.[52] In 1983 Bengue et al. classified the recessions according to the coverage prognosis which were U-type expecting poor prognosis, V-type expecting fair prognosis and I-type expecting good prognosis.

For decades the most commonly used gingival recession classification was given by P D Miller in 1985. He primarily based his classification on the extent of defects and extent of hard and soft tissue loss in interdental areas surrounding the gingival

recession defects.[5] In 1997, Smith proposed an Index of Recession, which provided a basis for evaluating treatment modalities.[54] In 1998, Norland and Tarnow proposed a classification system for loss of papillary height using readily identifiable landmarks for reference and allows for quick descriptive assessment.[10] In 2010, A Mahajan introduced modifications to Miller's classification, stating that the extent of gingival recession defect in relation to MGJ should be separate from bone and soft tissue loss in the interdental areas and criteria should be included to differentiate between the bone and soft tissue loss in Class III and IV defects but it also had limitations.

Although Miller's classification has been used extensively its limitations stated by Kumar and Masamatti include:

1) The MGJ is used as a reference point and is not an easily identifiable oral landmark. This creates difficulties in distinguishing classification between Class I and II and would easily represent a single group.
2) In Class III and IV the amount and type of bone loss has not been specified and there is no exact specifications given to evaluate the level of interdental papilla and amount of loss, thus clarity of the severity of recession is hard to project.
3) Those cases which have interproxiaml bone loss and marginal recession but do not extend to the MGJ cannot be classified in either Class I or Class III because the interproximal bone loss or the gingival margin does not extend to the MGJ respectively.
4) The classification does not specify facial (F) or lingual (L) involvement of the marginal tissue.

5) When there is recession of interdental papilla alone, it cannot be classified under Miller's classification.

6) Palatal recessions are difficult to classify under Miller's classification as there is no MGJ on palatal aspect of the maxillary arch. Keeping in mind that mucogingival treatments are required for reasons other than just aesthetics, and gingival recessions on the palatal aspect changes overall diagnosis and prognosis of a case; it is important then that a palatal classification for gingival recessions should specify the type of recession and quantify the amount of loss on the palatal aspect as well.

7) The anticipation of 100% root coverage in Class I and II recessions given in Miller's criteria, with partial root coverage in Class III and no root coverage in Class IV does not mean that it will occur in all cases. Root coverage ranging from 9% to 90% have been reported by various authors using different techniques for Class I and II root coverage. This range is quite high which means that the prognosis clearly depends on other prognostic factors as well.[9]

In 2011 Cairo et al. classified gingival recession based on the assessment of clinical attachment level at both buccal and interproximal sites which is an important site-related prognostic factor. However, it did not take in to consideration the remaining width of attached gingiva, relationship of gingival margin and MGJ. These govern the choice of treatment procedure and tooth malposition also affects treatment outcome.[8] Also in 2011 Rotundo et al. classified gingival recession taking into consideration both soft and hard dental tissues. Specific taxonomic variables were considered for this classification, in particular. the amount of keratinized tissue (KT = 2 mm); the presence or absence of non-carious cervical lesion (NCCL), with a consequent unidentifiable CEJ; and the presence or absence of interproximal attachment loss.[55]

In 2013 a new classification system was proposed by Kumar and Masamatti which is an amalgamation of certain criteria of Miller's classification with certain features of Nordland and Tarnow's classification. All variants of papillary and gingival recessions have been conveniently covered under this classification. Therefore, this classification is extensive, comprehensive and easy to use. Thus we have taken up this classification for use in our present study.

Root coverage procedures are aimed at achieving both tangible (resolution of dentinal hypersensitivity, recession coverage and aesthetic dilemma) and intangible benefits (ciinical attachment gain, increased keratinized tissue height and gingival thickness) to the patients.[56] Various procedures have been developed and used to obtain root coverage of single rooted teeth. Class IA and IIB gingival recessions hold out the best promise for root coverage as there is no or minimal interdental bone and soft tissue loss associated with these recessions

The three main different approaches used commonly and effectively to achieve root coverage are the free gingival graft, the coronally advanced flap (CAF) and combined procedures involving CAF with tissue/material interposed between the flap and root surface.[18] CAF has been used by many clinicians for decades with varying degrees of success to cover the recession defects. Histologically, this technique leads to reformation of junctional epithelium and the connective tissue attachment with little to minimal bone repair. This connective tissue attachment achieved by CAF is not stable over long periods, and various adjunctive agents have been used to promote healing and to further enhance the clinical outcomes.[57]

Pini-Prato G, Baldi C et al (1999)[19], Saletta D, Pini Prato G et al (2001)[20], and Pini-Prato GP, Cairo F et al (2010)[29] conducted studies for the clinical outcome of the

coronally advanced flap in the treatment of gingival recessions with improved success rate and increased the amount of root coverage. Some studies included CAF in addition to adjunctive surgical therapies to achieve maximum root coverage.

PRF

PRF which is composed of a tetra molecular structure with leukocytes, platelets, cytokines and stem cells, is a second-generation platelet concentrate and an autologous leukocyte-platelet-rich fibrin matrix. It is utilised as a bioactive surgical additive that is commonly used to regulate inflammation and increase healing process. Platelets play a crucial role not only in haemostatic process, but also in the wound healing process. Fibrin, fibronectin, platelet derived growth factors (PDGF), and transforming growth factors (TGF-b) trapped within the biodegradable scaffold release over time into the post surgical site which are essential to modulate integrin expression, fibroblast proliferation and their migration inside the wound. Development of microvascularization is favoured and epithelial cell migration is guided to its surface. PRF can also be utilised as a resorbable interpositional membrane.[58] The PRF layer avoids early invagination of the gingival epithelium, thereby serving as a barrier to epithelium migration.[59]

PRF additionally serves as a vehicle in carrying cells involved in tissue regeneration and seems to have a sustained release of growth factors (TGFb1, PDGF-AB, VEGF) in a period between 1 and 4 weeks, stimulating the environment for wound healing in a significant amount of time.

This has been used successfully in combination with CAF for root coverage in isolated and multiple gingival recessions.

L H Huang and associates[23] in 2005 employed a formula for calculating percentage for root coverage which we have also used in our statistical analysis for this study at 3 and 6 months of clinical post operative follow up. It is as follows:

$$\text{Percentage of root coverage} = \frac{\text{Preoperative recession depth} - \text{Postoperative recession depth}}{\text{Preoperative recession depth}} \times 100$$

Therefore, this study was conceived with an aim to clinically evaluate the prognosis of root coverage for gingival recessions under the new classification delineated by Kumar and Massarnatti using coronally advanced flap surgeries in combination with PRF membrane. Patients who presented with Class IA & IIB gingival recessions were treated surgically and recordings for the clinical parameters were taken at baseline, 3 month and 6 month intervals.

CLINICAL PARAMETERS:

GINGIVAL INDEX

It is evident from Table 2 & Fig 2 that in Class IA cases showed a significant decrease in gingival index (GI) from baseline to 3 months and baseline to 6 months with a p-value of 0.0001 which is statistically highly significant, indicating there is reduction in gingival inflammation from baseline to 3 months and baseline to 6 months. The mean change in GI from 3 months to 6 months was also observed with a p-value of 0.01 which is also statistically significant. From Table 4 & Fig 4 it is evident that in Class IIB cases there was significant decrease in GI from baseline to 3 months and from baseline to 6 months both having a p-value of 0.0001, which is statistically highly significant, indicating there is reduction in gingival inflammation from baseline to 3 months and baseline to 6 months. However, there was an increase in GI scores from 3 months to 6 months with a p-value of 0.32 which is statistically not significant.

This suggests that gingival index scores were better in patients who were probably more compliant with oral hygiene measures. These efforts however seemed to wane during the 3 to 6 month period post operatively. Continued motivation and patient education[60,61] in oral hygiene techniques could help alleviate this. Increased patient compliance upon raising awareness will encourage the patients towards preventing conditions that may contribute to the recurrence of gingival recessions.

DEFECT DEPTH

It is evident from Table-6 & Fig. 6 that in Class IA cases there was significant decrease in defect depth (DD) from baseline to 3 months and baseline to 6 months

with a p-value of 0.0001 which is statistically highly significant. These results indicate that the surgical procedures performed were highly satisfactory in terms of root coverage and the root coverage achieved was maintained to a significant degree. The mean change in DD from 3 months to 6 months showed an increase in defect depth with a p-value of 0.002 is also statistically significant. This indicates that slight recession occurred from 3 months to 6 months. Although the increase of defect depth is statistically significant when compared from 3 months to 6 months, however, it is not biologically significant if we compare it from values at the baseline. From Table 8 & Fig 8 in Class IIB cases, similar decrease in DD from baseline to 3 months and from baseline to 6 months was observed. Both resulted in a p-value of 0.0001, which is statistically highly significant and the mean change in DD from 3 months to 6 months resulted in an increase by p-value of 0.0001 which is statistically very highly significant. As in Class IA cases, in Class IIB cases we obtained highly satisfactory root coverage with slight recession occurring between the 3 and 6 month interval.

This suggests that in GR cases which clinically presented under the category of Class IA and IIB, root coverage was achieved to a significant degree with treatment of these defects via conventional corrective surgical procedures. With patient compliance and education to further prevent relapse, the root coverage achieved was maintained beyond 3 months post operatively as well.

Our study is similar to those results observed by Latha TA et al. [62] Their overall comparisons were highly significant at a p-value of $P < 0.001$. Lafzi A, et al[63] showed statistically significant result for root coverage as well with a p value of P=0.004. A study done by Gupta S et al[31] had statistically significant improvement from baseline to the 3 and 6 month intervals; however, between 3 and 6 months, the difference was

statistically not significant. This is a desired result as the root coverage obtained by the surgical root coverage procedure has not decreased over the extended period post operatively and can be explained by the reversal of patients' behaviour toward tooth brushing technique and oral hygiene maintenance.

CAL

It is evident from Table-10 & Fig. 10 in Class IA cases there was significant increase in clinical attachment level from baseline to 3 months and baseline to 6 months with a p-value of 0.0001 which is statistically very highly significant. This indicates that the root coverage achieved through surgical procedures were highly satisfactory and CAL gained was maintained to a significant degree. The mean change in CAL from 3 months to 6 months showed an increase by a p-value of 0.04 which is statistically significant, however not biologically significant if we compare these from baseline values. From Table 12 & Fig 12 in Class IIB cases, similar increase in CAL from baseline to 3 months and from baseline to 6 months was observed. Both resulted in a p-value of 0.0001, which is statistically highly significant and the mean change in CAL from 3 months to 6 months resulted in an increase by a p-value of 0.0001 which is again statistically highly significant. As in Class IA cases, in Class IIB cases we obtained highly satisfactory root coverage with slight recession occurring between the 3 and 6 month interval.

This suggests that in GR cases which clinically presented under the category of Class IA and Class IIB, the clinical attachment level was gained to a desirable and significant degree. With patient compliance and education to further prevent relapse, the CAL gain achieved was maintained beyond 3 months post operatively as well.

Our study was found to be congruent with those results observed by Latha TA et al.[62] The overall comparisons in their study were highly significant at a p-value of $P < 0.001$. CAL showed significant changes compared to the baseline values with a p-value of $P=0.004$ in the study conducted by Lafzi A, et al[63]. The gain in clinical attachment as observed by Gupta S et al[31] can be attributed to the decrease in PPDs and increased recession coverage as a result of the formation of new connective tissue attachment.

WIDTH OF ATTACHED GINGIVA

It is evident from Table-14 & Fig. 14 in Class IA cases that there was significant increase in width of attached gingiva from baseline to 3 months and baseline to 6 months with a p-value of 0.0001 which is statistically highly significant. This indicates that the root coverage achieved through surgical procedures are highly satisfactory and width of attached gingiva (WAG) gained was maintained to a significant degree. The mean change in WAG from 3 months to 6 months showed slight reduction with a p-value of 0.07 which is statistically not significant, indicating that the root coverage achieved although reduced between the 3 and 6 month period, overall gain was maintained and no reversal to the previous level of the defect of gingival recession is seen. This is an expected outcome. From Table 16 & Fig 16 in Class IIB cases, similar increase in WAG from baseline to 3 months and from baseline to 6 months was observed. Both resulted in a p-value of 0.0001, which is statistically highly significant and the mean change WAG from 3 months to 6 months resulted in a reduction with a p-value of 0.0001 which is again statistically highly significant yet biologically not significant when compared from baseline values. As in

Class IA cases, in Class IIB cases we obtained highly satisfactory gain in WAG with slight reduction occurring between the 3 and 6 month interval.

This suggests that in GR cases which clinically presented under the category of Class IA and IIB cases, there was increase of the width of attached gingiva to a significant degree with surgical treatment of these defects for root coverage. With patient compliance and education to further prevent relapse, the WAG gain achieved was maintained beyond 3 months post operatively as well.

Again our study is congruent with those results observed by Latha TA, et al.[62] Their overall comparisons were highly significant at a p-value of $P < 0.001$. Lafzi A, et al[63]showed statistically significant result for WAG as well, with a p value of $P=0.01$, although reduction occurred between the 1st and 3rd month. Maintenance of increased width of attached gingiva and the gingival margin may be attributed to the placement of PRF slightly hanging over the gingival collar as proposed by Del Corso, et al[24] which stimulates the interface between gingival tissue and root surface along the whole length of the flap.

Additionally, for all the above parameters Baldi et al.[64], Pini Prato et al.[65], Pini Prato et al.[66], Huang et al.[23] and de Sanctis and Zuchhelli[67] reported similar results to our study.

PERCENTAGE ROOT COVERAGE WITH RESPECT TO DEFECT DEPTH

It is evident from Table 17 & Fig 17 in Class IA cases, the percentage root coverage gained from baseline to 3 months and baseline to 6 months was 88.09±15.41% and 82.65±19.35% respectively. From Table 18 & Fig 18 in Class IIB cases, the percentage root coverage gained from baseline to 3 months and baseline to 6 months

was 85.80±16.56% and 62.61±19.44% respectively. We observed a very desirable and significant defect depth decrease which was maintained better over the first 3 months post operatively and decreased slightly over the 3 to 6 month period.

We achieved favourable root coverage percentages and these findings are similar to some previous studies mentioned above. Lafzi A, et al[63] achieved an average of 75% root coverage and Huang, et al[23] reported a mean RC of 83.5%. These values are comparatively slightly lesser than what we achieved in our study, which could be due to varied surgical and adjunctive therapies applied along with the factors that affect different countries specifically, inclusion and exclusion criteria and patient compliance. The higher RC percentage result might have been due to a more favourable and predictable RC of the Class IA and Class IIB defects which are comparable to Miller's Class I and Class II defects.

When determining the prognostic accuracy of root coverage procedures in our study we are mindful of the fact that various clinicians have achieved slightly better results for root coverage and conversely greatly depreciative results as well. Under Miller's Classes I and II, range from 9% root coverage described by M Paolantonio et al. in 1997[13] to 90% root coverage described by PD Miller 1985[12] of complete root coverage following free gingival graft procedure. Similarly from 9% root coverage described by L Trombelli et al. in 1996[14] to 89% root coverage described by G Zucchelli & M De Sanctis in 2000[68] were achieved following CAF. Intermediate values of 40% root coverage was described by P Bouchard, R Nilveus, and D Etienne in 1997[69] with a better percentage result of 80% root coverage described by R J Harris in 1992[70] following CAF+CTG.

PERCENTAGE ROOT COVERAGE WITH RESPECT TO CLINICAL ATTACHMENT LEVEL

It is evident from Table 19 & Fig 19 in Class IA cases, the percentage CAL gained from baseline to 3 months and baseline to 6 months was 76.22±11.74% and 70.81±16.70% respectively. From Table 20 & Fig 20 in Class IIB cases, the percentage CAL gained from baseline to 3 months and baseline to 6 months was 71.78±10.41% and 52.94±13.10% respectively. We observed a desirable and very significant CAL gain which was maintained better over the first 3 months post operatively and reduced slightly over the 3 to 6 month period.

To the best of our literature research we could not find any studies which included in their results a comparison of root coverage with respect to CAL gain in terms of percentage. This significant result is an expected achievement as there will be percentage gain in CAL when the defect depth has been reduced significantly.

PERCENTAGE ROOT COVERAGE WITH RESPECT TO WIDTH OF ATTACHED GINGIVA

It is evident from Table 21 & Fig 21 in Class IA cases, the percentage WAG gained from baseline to 3 months and baseline to 6 months was 109.80±126.63% and 106.04±130.65% respectively. From Table 22 & Fig 22 in Class IIB cases, the percentage WAG gained from baseline to 3 months and baseline to 6 months was 162.66±195.62% and 120.83±167.97% respectively. We observed a good and significant WAG gain which was maintained better over the first 3 months post operatively and reduced slightly over the 3 to 6 month period.

When the DD and CAL has maintained these good outcomes in the treatment of Class IA and Class IIB, it is natural that the gain in WAG would follow suit and result in gain and maintenance of a healthy and desirable WAG.

To the best of our literature research we could not find any studies which included in their results a comparison of root coverage with respect to WAG gain in terms of percentage.

WAG is a critical factor for maintenance of gingival health and the growth factors from the PRF may have a positive effect because of increased proliferation of fibroblast and biological activity from granulation tissue derived from periodontal ligament. Aroca S et al (2009)[40] , Keceli HG et al (2015)[46] and Hehn J et al (2016)[47] concluded that the addition of a PRF membrane positioned under the CAF provided no clinical change in achievement of root coverage and their clinical parameters such as PPD, CAL and width of attached gingiva; however, there was an additional gain in gingival thickness at 6 months compared to conventional therapy. Aleksic Z et al (2010)[42] and AL Jasser R et al (2017)[49] found that the reduced post-operative pain and accelerated healing accentuated by the PRF offers an advantage in conjunction with surgical root coverage.

We have observed within our clinical study a significant and desirable improvement across all clinical parameters from baseline to 3 months and baseline to 6 months which remained statistically highly significant till our 6 month follow-up. Although between the 3 to 6 month intervals clinical parameters showed a slight to marginal regression or rebound, this is an expected biological outcome. Pini-Prato G.[11] stated that there was a wide range of root coverage reported from 9%-90% by various clinicians using varied surgical techniques in treatment of cases which categorise

under Miller's Class I and Class II GR cases . Factors which may have contributed to this disparity could be due to imperfect classification of GR, case selection, clinician judgement and the varied surgical techniques employed with or without adjunctive therapeutic materials for the root coverage outcome and elimination or reduction of the existing clinical defect. Noteworthy is the fact that the Class IIB category under Kumar and Masamatti's nomenclature cannot be categorised under Miller's classification causing ambiguity for those specific cases that have interproximal bone loss but the gingival margin does not extend to the MGJ. Those which extend to the MGJ, clearly fall under Miller's Class II category. The defects that extend to the MGJ are extensive and would have been invariably present for a longer period of time affecting gingival tissue memory and causing defects on the root surface of the teeth. Hence, regaining the complete depth of the root coverage would naturally be more arduous and biologically and practically not possible. Thus attributing to the wide range in results and inappropriate classification of which we have previously discussed its limitations.

We suggest we achieved better and consistent results due to our choice of classification employed and class selection under a relatively new classification, namely Class IA and Class IIB GR defects under Kumar and Masamatti's categorisation, where the defect does not extend to the MGJ.

Conclusion

CONCLUSION

The root coverage procedures were conducted for Class IA and Class IIB gingival recessions and following are the conclusions:

1. In both Class IA & IIB cases, the GI reduced significantly from baseline to 3 months and from baseline to 6 months. The mean change in GI from baseline to 3 months and baseline to 6 months for both class IA & IIB cases was statistically highly significant with a p value of 0.0001.
2. In both Class IA & IIB cases, the mean defect depth reduced significantly from baseline to 3 months and from baseline to 6 months. The mean change in defect depth from baseline to 3 months and baseline to 6 months for both Class IA & IIB cases was statistically highly significant with a p-value of 0.0001.
3. In both Class IA & IIB cases, the mean gain in CAL increased significantly from baseline to 3 months and from baseline to 6 months. The mean change in CAL from baseline to 3 months and baseline to 6 months for both Class IA & IIB cases was statistically highly significant with a p-value of 0.0001.
4. In both Class IA & IIB cases, the mean width of attached gingiva increased significantly from baseline to 3 months and from baseline to 6 months. The mean change in width of attached gingiva from baseline to 3 months and baseline to 6 months for both Class IA & IIB cases was statistically highly significant with a p-value of 0.0001.
5. In Class IA cases the %age root coverage in defect depth was 88.09±15.41% and 82.65±19.35% from baseline to 3 months and baseline to 6 months respectively. In Class IIB cases the %age root coverage in defect depth was 85.80±16.56% and 62.61±19.44% from baseline to 3 months and baseline to 6 months respectively.

6. In Class IA cases the %age root coverage with respect to CAL gain was 76.22±11.74% and 70.81±16.70% from baseline to 3 months and baseline to 6 months respectively. In Class IIB cases the %age root coverage with respect to CAL gain was 71.78±10.41% and 52.94±13.10% from baseline to 3 months and baseline to 6 months respectively.

7. In Class IA cases the %age root coverage with respect to width of attached gingiva gain was 109.80±126.63% and 106.04±130.65% from baseline to 3 months and baseline to 6 months respectively. In Class IIB cases the %age of root coverage in width of attached gingiva gain was 162.66±195.62% and 120.83±167.97% from baseline to 3 months and baseline to 6 months respectively.

Root coverage with respect to defect depth, CAL and width of attached gingiva, all showed a statistically highly significant gain.

Our study showed consistent results up till a 6 month follow-up indicating that desirable root coverage was attained with respect to defect depth, clinical attachment level and width of attached gingiva. Thus with this classification as given under Kumar and Masamatti we can better categorize gingival recessions and predict the prognosis with least variations. Various root coverage procedures can thus be more accurately assessed and compared. Here in this study we thus conclude that Class IA and IIB cases will have good prognosis for root coverage.

As our study suggests, choosing the right kind of classification to categorize gingival recessions greatly enhances the ease of diagnosis as well as predictability and accuracy of prognosis. Such elaborate and comprehensive classification systems may further be used for predicting prognosis of surgical outcome for various other types of GR defects as well.

Summary

SUMMARY

Introduction

Gingival recession is defined as "the displacement of marginal tissue apical to the cemento-enamel junction."[1] Often the marginal tissue may lie at the level of alveolar mucosa, thus the term "marginal tissue recession" is considered to be more accurate than "gingival recession,".[2,3]

Classification of gingival recession by Ashish Kumar and Sujata Surendra Masamatti[9] in 2013 is relatively comprehensive and easy to use when compared to previous classification systems. Pertinent information on clinical examination of a case increases efficacy and efficiency in providing diagnosis, predicting prognosis and choosing treatment plan.

Gingival recession can be adequately treated utilizing various surgical techniques such as lateral pedicle flap, coronally advanced flap, free gingival graft, sub-epithelial connective tissue grafts, GTR techniques, etc.[4] These procedures alone or in combination with adjunctive therapies have been reported to result in varied clinical outcomes.

Aim and Objectives

The aim of our present study is to determine the prognostic outcome and accuracy after surgical treatment of gingival recessions classified under Kumar and Masamatti's classification with the objective of including analysis of root coverage in

Class IA and Class IIB gingival recessions after coronally advanced flap surgical therapy along with PRF. We also determined the accuracy of prognosis under this system of gingival recession classification, to enable better judgment of treatment outcomes more veraciously in the future, both for ourselves and other clinicians.

Materials and Methods

The methodology of our study included selection of patients who were categorized within our inclusion and exclusion criteria and 40 sites exhibiting Class IA (20) & Class IIB (20) were evaluated and assessed under Kumar and Masamatti's classification. These patients were then surgically treated employing the coronally advanced flap with PRF and their clinical parameters were recorded at baseline, 3 month and 6 month intervals keeping the patient on the maintenance phase of therapy post operatively. Upon statistical analysis of the clinical parameters, we were able to determine the percentage root coverage achieved. When we compared our results with other studies with similar GR cases classified under Miller's classification, we found a more accurate prognosis may be determined when cases are classified under the more specific and comprehensive categorization of this newer detailed classification.

Results and Discussion

Our results were better and consistent due to the choice and use of Kumar and Masamatti's classification for demarcating Class IA and Class IIB GR defects. At the end of our six month study the percentage root coverage gained for Class IA and Class IIB were 82.65±19.35% and 62.61±19.44% respectively. Across the board other studies achieved a 9%-90% range for root coverage of Class I and Class II GR defects under Miller's classification. Comparatively, 90% root coverage was described by PD Miller[12], 89% root coverage described by G Zucchelli & M De Sanctis[68], Huang, et al[23] reported a mean RC of 83.5%, 80% root coverage described by R J Harris[70], Lafzi A, et al[63] achieved an average of 75% root coverage and 40% root coverage was described by P Bouchard, R Nilveus, and D Etienne[69] for Miller's Class I and Class II

GRs. At the lower end of the range 9% root coverage was achieved by M Paolantonio et al.[13] and similarly 9% root coverage described by L Trombelli et al[14].

Conclusion

Thus with this classification as given under Kumar and Masamatti we can better categorize gingival recessions and predict the prognosis with least variations. Various root coverage procedures can thus be more accurately assessed and compared. Here in this study we thus conclude that class IA and IIB will have good prognosis for root coverage.

As our study suggests, choosing the right kind of classification to categorize gingival recessions greatly enhances the ease of diagnosis as well as predictability and accuracy of prognosis. Such elaborate and comprehensive classification systems may further be used for predicting prognosis of surgical outcome for various other types of GR defects as well.

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Appendices

APPENDIX

APPENDIX – I

ETHICAL COMMITTEE APPROVAL FORM

Babu Banarasi Das University
Babu Banarasi Das College of Dental Sciences,
BBD City, Faizabad Road, Lucknow – 226028 (INDIA)

Dr. Lakshmi Bala
Professor and Head Biochemistry and
Member-Secretary, Institutional Ethics Committee

Communication of the Decision of the IIIrd Institutional Ethics Sub - Committee

BBDCODS/05/2016

IEC Code: 02

Title of the Project: Determination of prognostic accuracy of gingival recession classification.

Principal Investigator: Dr. Jean Fernetta Samuel **Department:** Periodontology

Name and Address of the Institution: BBD College of Dental Sciences Lucknow.

Type of Submission: New, MDS Project Protocol

Dear Dr. Jean Fernetta Samuel,

The Institutional Ethics Sub-Committee meeting comprising following four members was held on 03rd May, 2016.

1.	Dr. Lakshmi Bala Member Secretary	Prof. and Head, Department of Biochemistry, BBDCODS, Lucknow
2.	Dr. Narendra Kumar Gupta Member	Prof., Department of Prosthodontics, BBDCODS, Lucknow
3.	Dr. Smita Govila Member	Reader, Department of Conservative Dentistry, BBDCODS, Lucknow
4.	Dr. Subhash Singh	Reader, Department of Pedodontics, BBDCODS, Lucknow

The committee reviewed and discussed your submitted documents of the current MDS Project Protocol in the meeting.
The proposal was reviewed, comments were communicated to PI thereafter it was revised.

Decisions: The committee approved the above protocol from ethics point of view.

Forwarded by:

Lakshmi Bala 12/05/16

(Dr. Lakshmi Bala)
Member-Secretary
IEC

Institutional Ethic Committee
BBD College of Dental Sciences
BBD University
Faizabad Road, Lucknow-226028

(Dr. Vivek Govila)
Principal
BBDCODS

PRINCIPAL
Babu Banarasi Das College of Dental Sciences
(Babu Banarasi Das University)
BBD City, Faizabad Road, Lucknow-226028

APPENDIX – II

INSTITUTIONAL RESEARCH COMMITTEE APPROVAL FORM

BABU BANARASI DAS COLLEGE OF DENTAL SCIENCES
(FACULTY OF BBD UNIVERSITY), LUCKNOW

INSTITUTIONAL RESEARCH COMMITTEE APPROVAL

The project titled **Determination of Prognostic Accuracy of Gingival Recession Classification** submitted by **Dr. Jean Fernetta Samuel** Post graduate student from the Department of **Periodontics** as part of MDS Curriculum for the academic year 2015-2018 with the Accompanying proforma was reviewed by the institutional research committee present on **23rd and 24th February 2016** at BBDCODS. The Committee has granted approval on the scientific content of the project. The proposal may now be reviewed by the institutional ethics committee for granting ethical approval.

Prof. (Dr).Vivek Govila

Dean

DEAN
BBD College of Dental Sciences
BBD University
Faizabad Road Lucknow-226028

Chairperson Institutional Research Committee

APPENDIX – III

CASE SHEET

Class -

NAME-

AGE-

SEX-

ADDRESS-

CHIEF COMPLAINT-

HISTORY OF PRESENT ILLNESS-

DIAGNOSIS:-

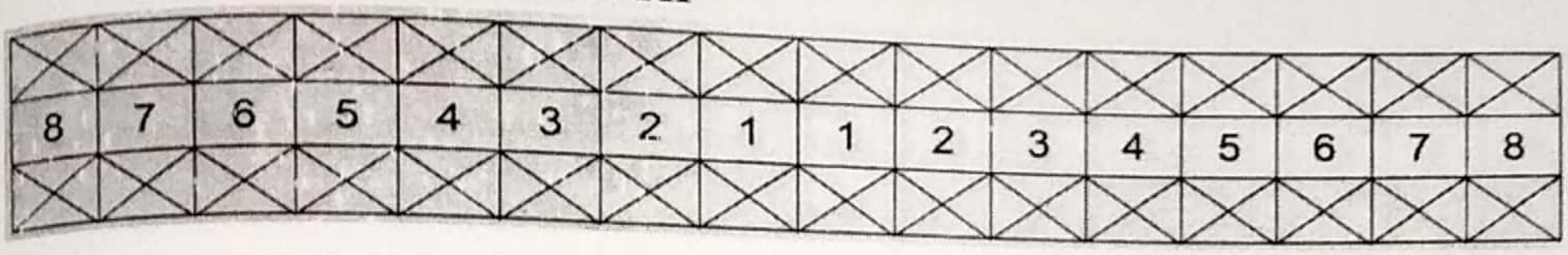
PROGNOSIS:-

TREATMENT PLAN:-

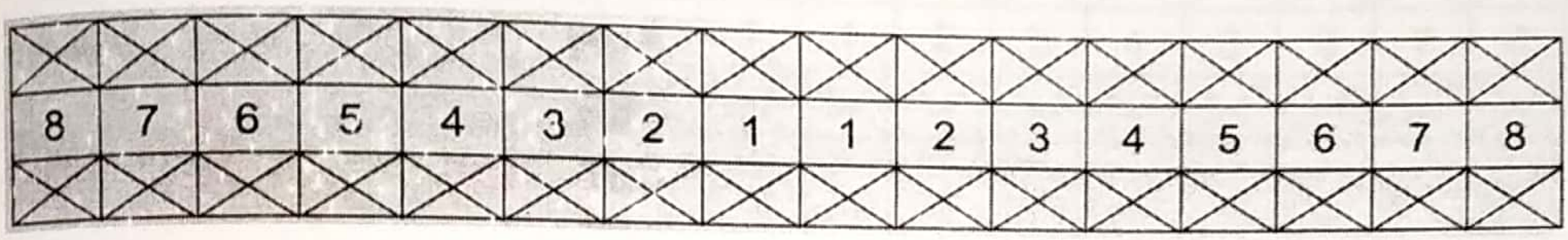
CLINICAL PARAMETERS-

A) AT BASELINE-

POCKET PROBING DEPTH



GINGIVAL INDEX – Loe&Silness 1963(defect specific)



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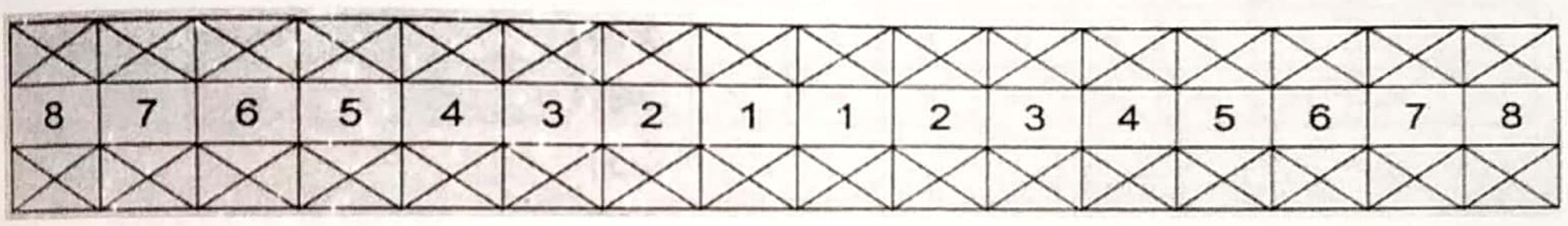

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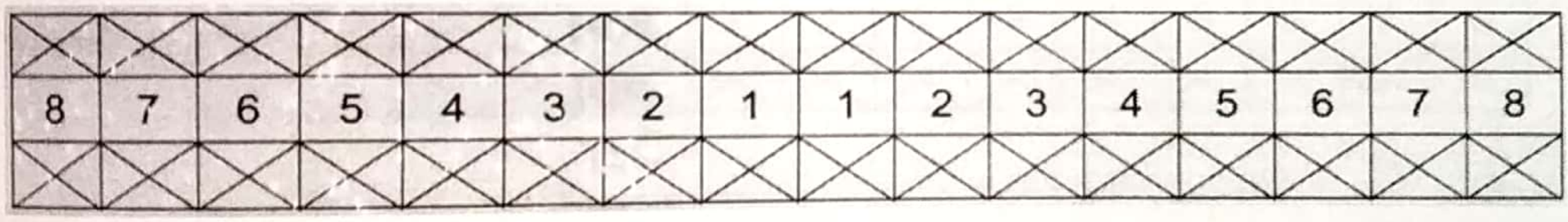

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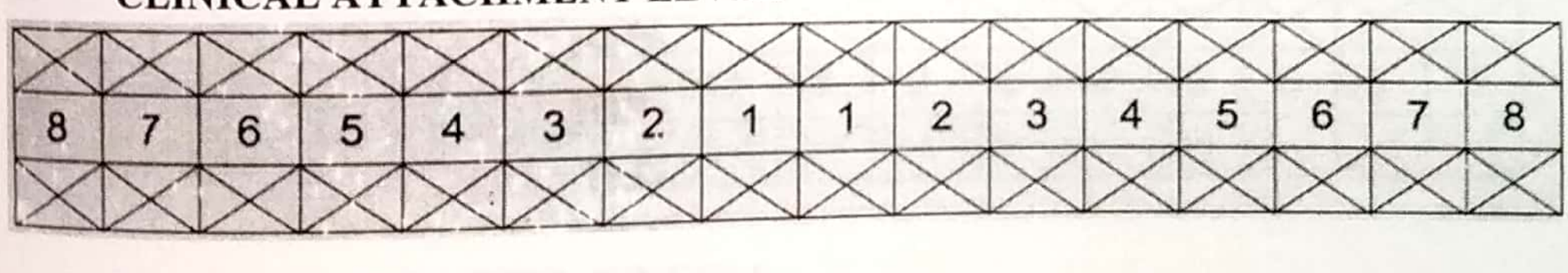

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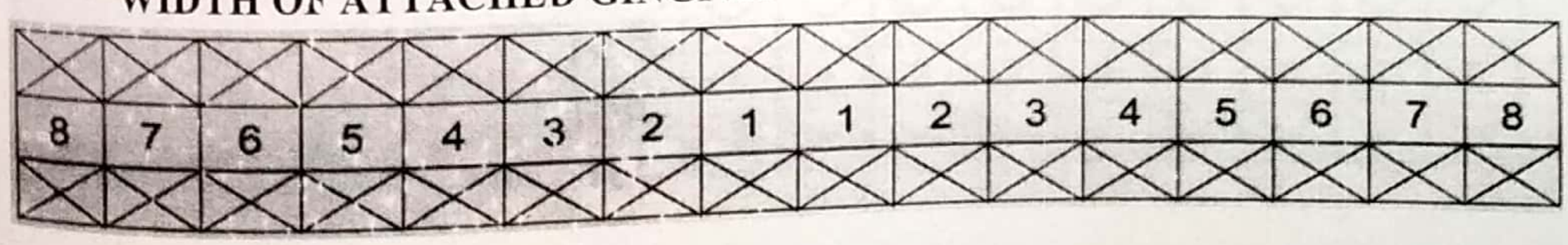
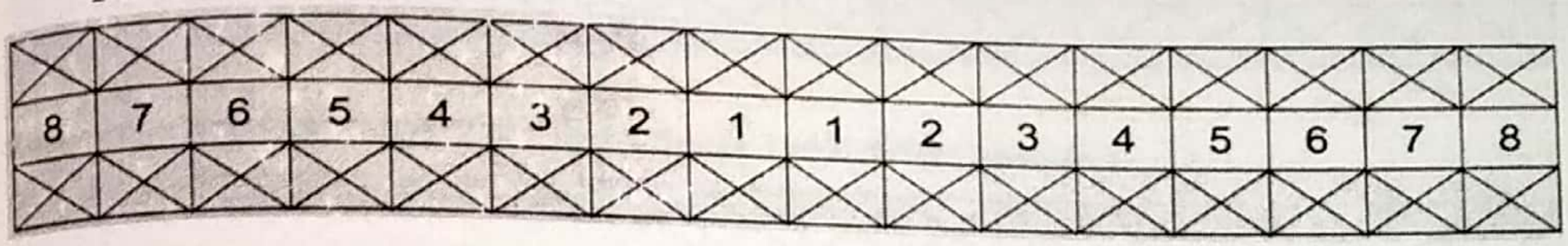


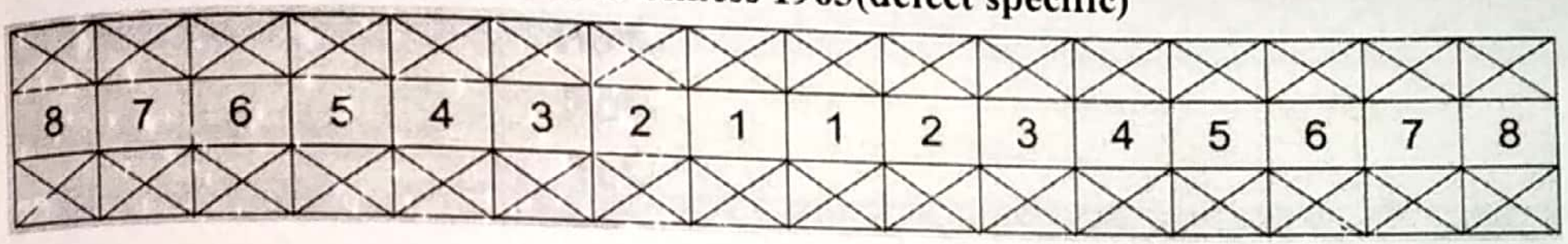
RADIOGRAPHIC PARAMETER - IOPA

B) EVALUATION AT 3 MONTH INTERVAL

POCKET PROBING DEPTH



GINGIVAL INDEX – Loe & Silness 1963(defect specific)



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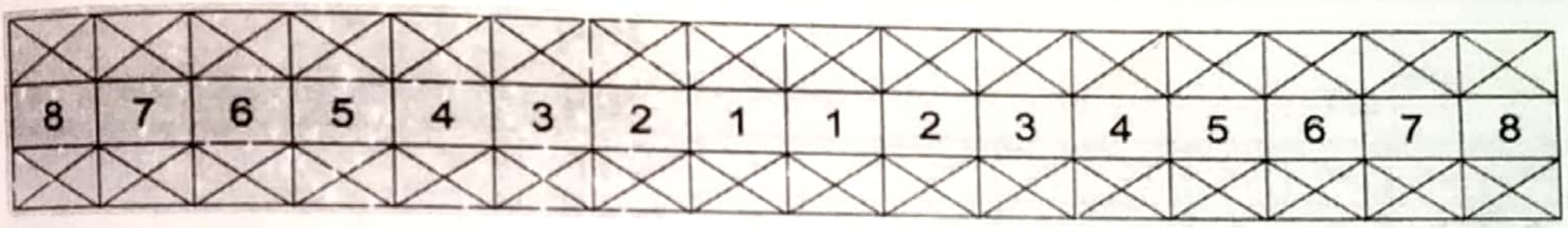

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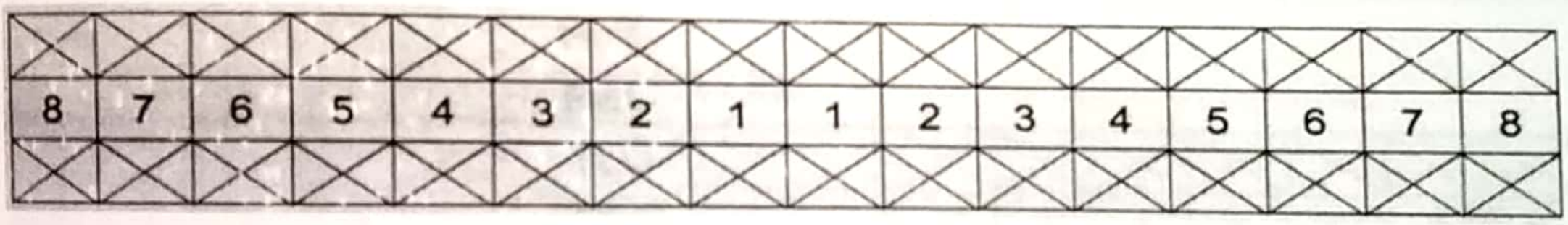

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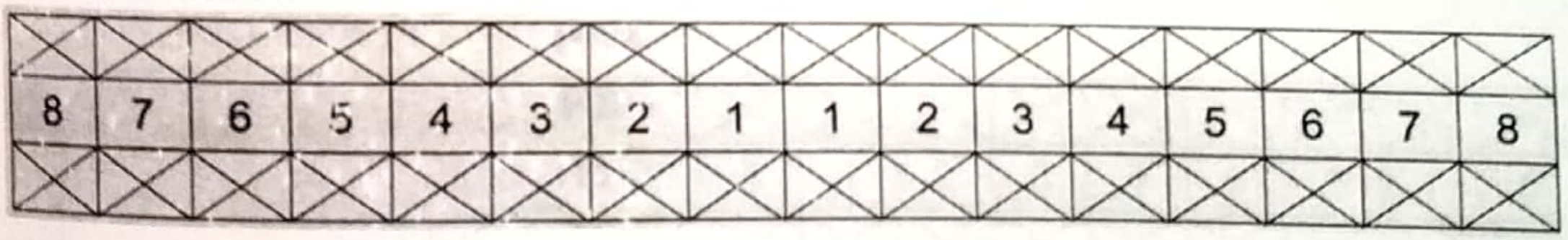

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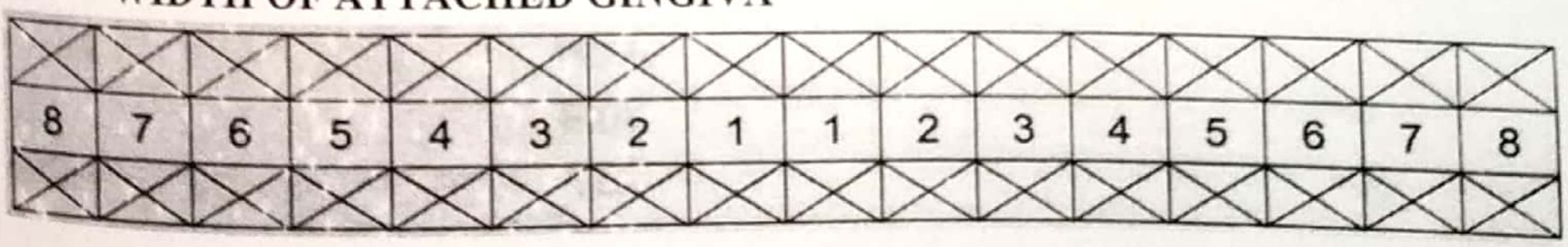
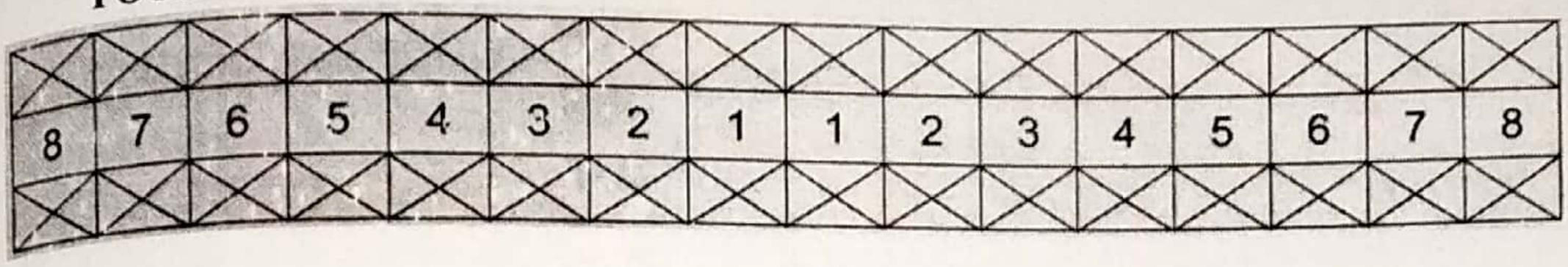


C) EVALUATION AT 6 MONTH INTERVAL

POCKET PROBING DEPTH



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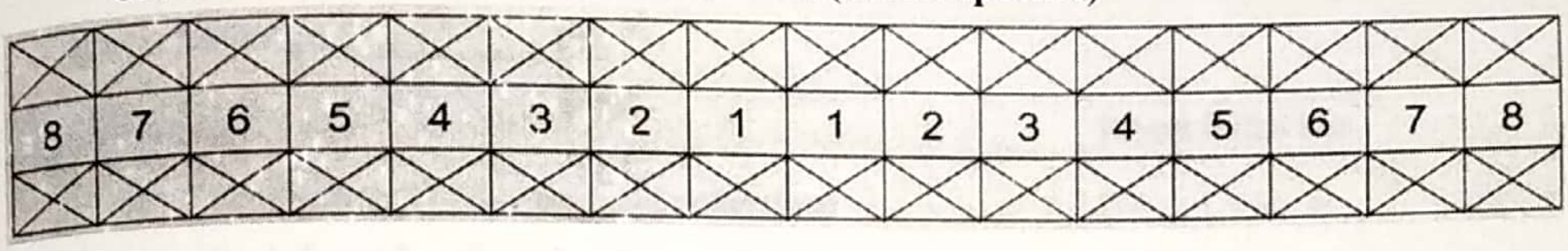

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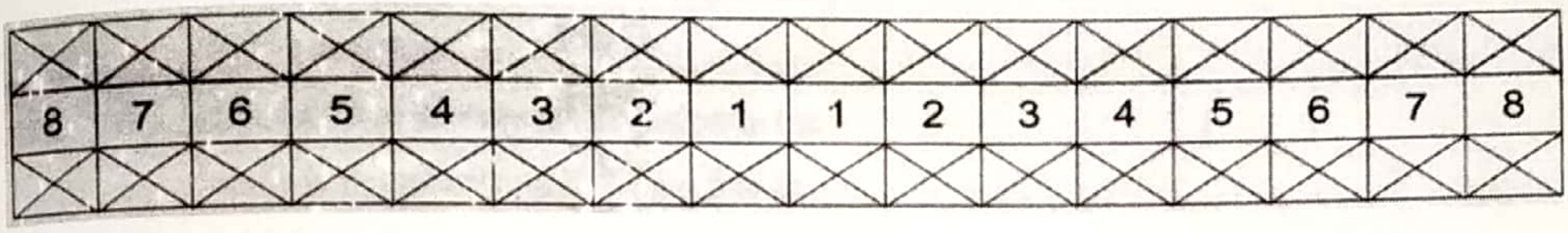

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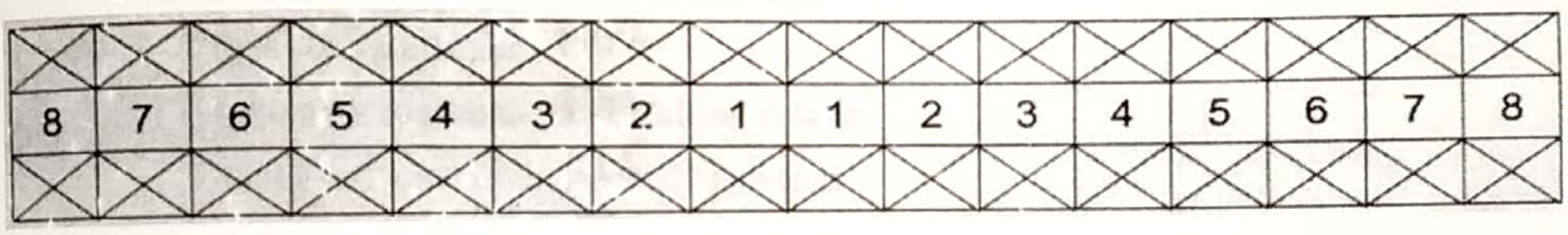

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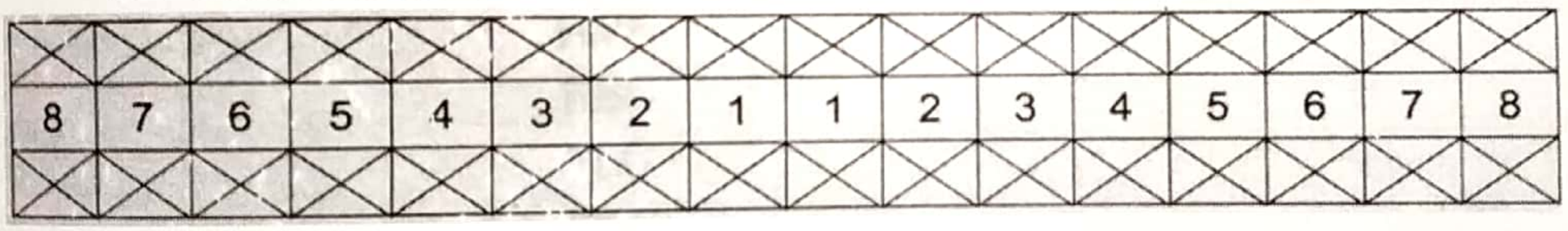

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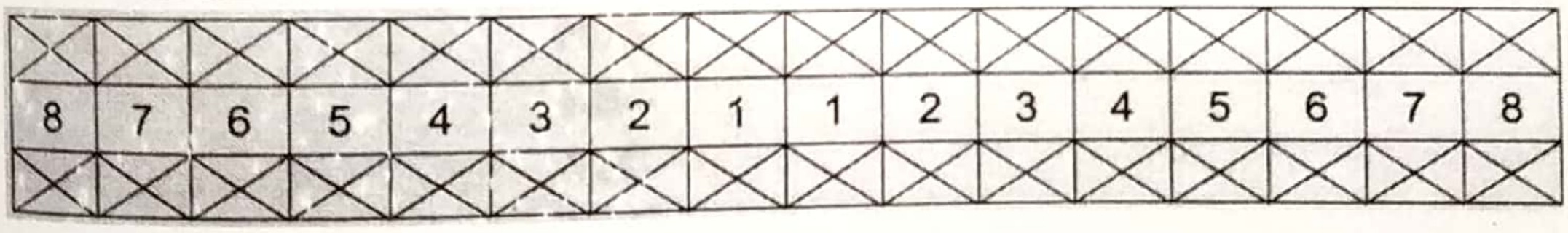

APPENDIX - IV

Informed Consent form

Study Title:

Subject's Initials: _____ Subject's Name:_____

Date of Birth/Age: _____

(Subject) Please initial box

(i) I confirm that I have read and understood the information sheet dated ___ __ for the above study and have had the opportunity to ask questions. [ ]

(ii) I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. [ ]

(iii) I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s) [ ]

(i) I agree to take part in the above study. [ ]

Subject Name (Print)

Subject Signature Date

I certify that the information provided was given in language that was understandable to the subject.

Name of Person Obtaining Informed Consent Date

(Print)

Signature of Person Obtaining Informed Consent Date

Signature & Date of Principal Investigator: _____

(if other than the Person Explaining Consent)

(* If a patient has limited ability to read and write, and impartial witness should be present during the entire informed consent discussion and his/her legally acceptable representative should sign on patient's behalf). In these instances the patient places his/her left thumb impression in the place of the signature.

Is Subject illiterate?

☐ Yes

☐ No

Subject's Initials _____

APPENDIX-V

BabuBanarasi Das College of Dental Sciences

(A Constituent Institution of BabuBanarasiDasUniversity)

BBDCity, Faizabad Road, Lucknow – 227105 (INDIA)

PARTICIPANT INFORMATION DOCUMENT (PID)

1. Study Title

Determination of the prognostic accuracy of gingival recession classifications.

2. Invitation Paragraph

You are being invited to take part in a research study, it is therefore important for you to understand why the study is being done and what it will involve. Please take time to read the following information carefully. Ask us for any clarifications or further information. Whether or not you wish to take part is your decision.

3. What is the purpose of the study?

The purpose of study is to determine the prognostic outcome and accuracy after surgical treatment of gingival recession for root coverage.

4. Why have I been chosen?

You have been chosen for this study as you are fulfilling the required criteria for the diseased condition.

5. Do I have to take part?

Your participation in the research is entirely voluntary. If you do consent, you will be given this information sheet to keep and will be asked to sign a consent form. During the study you still are free to withdraw at any time and without giving a reason.

6. What will happen to me if I take part?

This study will last for 6 months and you will be recalled at the time intervals of 7 days, 3 months and 6 months for evaluation after surgery.

Procedure includes collection of data by examining your oral cavity by a single examiner with the help of sterilized diagnostic instrument, taking radiographs if necessary and surgical treatment for root coverage.

7. What do I have to do?

You do not have to change your regular lifestyle for the investigation of the study. This research study is partially sponsored by the candidate. You will incur minimal cost for surgical procedures involved.

8. What is the procedure that is being tested?

The purpose of study is to determine the accuracy and future prognosis after surgical procedure for root coverage.

9. What are the interventions for the study?

The study includes surgical treatment with PRF (blood product).

10. What are the side effects of taking part?

There are no side effects on patients of this study.

11. What are the possible disadvantages and risks of taking part?

There are no possible disadvantages for the patients of this study.

12. What are the possible benefits of taking part?

The root of the tooth will be covered by gingiva to give good aesthetic appearance and reduction of tooth hypersensitivity.

13. What if new information becomes available?

If additional information becomes available during the course of the research you will be told about these and you are free to discuss it with your researcher, your researcher

will tell you whether you want to continue in the study. If you decide to withdraw, your researcher will make arrangements for your withdrawal. If you decide to continue in the study, you may be asked to sign an updated consent form.

14. What happens when the research study stops?

If the study stops/finishes before the stipulated time, this will be explained to the patient/volunteer.

15. What if something goes wrong?

If any severe adverse event occurs, or something goes wrong during the study, the complaints will be handled by reporting to the institution (s), and IEC.

16. Will my taking part in this study be kept confidential?

Yes it will be kept confidential.

17. What will happen to the results of the research study?

The results of the study may be used to provide data of the periodontal health status and the treatment needs in this region of India for planning of further large scale studies. Your identity will be kept confidential in case of any report/publications in concerned journals.

18. Who is organizing the research?

This research study is partially sponsored by the candidate. You will incur minimum surgical cost for any procedures involved.

19. Will the results of the study be made available after study is over?

Yes .

20. Who has reviewed the study?

The study has been reviewed and approved by the Head of the Department and the IEC of the institution.

21. Contact for further information

Dr Jean Fernetta Samuel
BabuBanarasi Das College of Dental Sciences
Lucknow
jfs4m@hotmail.com
+91-9676173075

OR

Dr.LaxmiBala,
Member Secretary,
BabuBanarasi Das College of Dental Sciences
Lucknow
bbdcods_iec@gmail.com

THANK YOU FOR PARTICIPATING IN THIS STUDY

Signature of Patient .....

Name of Patient .....

Date .....

APPENDIX-VI

BabuBanarasi Das College of Dental Sciences

(A Constituent Institution of BabuBanarasiDasUniversity)

BBDCity, Faizabad Road, Lucknow – 227105 (INDIA)

प्रतिभागी के लिए सूचना पत्र

1. अध्ययन शीर्षक

मसूढ़ों का दाँतों की जड़ों से नीचे खिसकने के वर्गीकरण की सटीकता एवं उसका वैज्ञानिक प्रमाणीकरण।

2. निमंत्रण अनुच्छेद

आपको एक शोध परीक्षण में भाग लेने के लिए आमंत्रित किया जा रहा है। इस से पहले आपके लिए यह समझना जरूरी है कि यह अध्ययन क्यों किया जा रहा है और उसमें क्या चीजे शामिल है। कृप्या अपना समय निकाल कर इस सूचना को पढें तथा अपनी इच्छानुसार अपने मित्रों, परिजनो तथा अपने चिकित्सक के साथ चर्चा करें। अगर आपको कोई जानकारी समझमें नही आती है या और चाहिए तो हमें बताए। आप अपना समय निकालकर इस सूचना को पढें और बताए कि आप अध्ययन में भाग लेना चाहते है कि नहीं

3. अध्ययन का उद्देश्य क्या है?

शल्य चिकित्सा के पश्चात् दाँतो की जडों को मसूढ़ों से ढ़ककर उसका समयबद्ध ऑकलन एवं सफलता की सम्भावना।

4. मुझे इस अध्ययन के लिए क्यों चुना गया है?

आपको इसलिए चुना गया है क्योकि बिमारी इस अध्ययन के अन्तर्गत आती है। इस अध्ययन में आपकी तरह लगभग 40 और लोगों को चुना जाएगा।

5. क्या इसमें मुझे भाग लेना चाहिए ?

यह आप पर निर्भर है कि आप को भाग लेना चाहिए की नहीं । यदि आप भाग लेने का फैसला करते है तो आपको अपने पास रखने के लिए एक सूचना पत्र दिया जाएगा और एक सहमति फार्म पर हस्ताक्षर करने के लिए कहा जाएगा। अध्ययन के दौरान आप कभी–भी किसी भी समय उचित कारण बताकर खुद को इस अध्ययन से स्वतंत्र कर सकते हैं।

6. मुझे क्या होगा यदि मैं इस अध्ययन में भाग लेता हूँ।

इस अध्ययन के अन्तर्गत आपकी जॉच एवं एक्सरे इलाज के पहले करवाई जाएगी और यह अध्ययन 6 महीने तक चलेगा जिसमे आपको इलाज के बाद सातवें दिन, तीसरा और छठें महीने मे आना होगा।

7. मुझे क्या करना है ?

इस अध्ययन में भाग लेने से जीवन शैली पर कोई प्रभाव नही पडेगा। आप अपने रोजमर्रा के काम जैसे–गाड़ी चलाना, खेलकूद, दवाएँ इत्यादि बिना किसी परेशानी के जारी रख सकते है।

8. किस प्रक्रिया का परीक्षण किया जा रहा है?

शल्य चिकित्सा के पश्चात दॉतो की जडों को मसूढ़ों से ढ़ककर उसका समय बद्ध ऑकलन एवं सफलता की सम्भावना।

9. इस शोध में कौन से हस्तक्षेप दिए जायेगें?

इस अध्ययन मे पी0आर0एफ0 रक्त उत्पाद के साथ शल्य चिकित्सा उपचार भी शामिल है।

10. इस अध्ययन में भाग लेने के क्या दुष्प्रभाव है?

इस अध्ययन का कोई भी दुष्प्रभाव नही है।

11. इस अध्ययन में भाग लेने के सम्भावित जोखिम और नुकसान क्या है?

इस अध्ययन में भाग लेने से कोई भी जोखिम और नुकसान नही है।

12. अध्ययन में भाग लेने के संभावित लाभ क्या हैं?

दॉतों की जड़ों को मसूढ़ों से ढकने से दिखने में सुन्दरता बढ़ जाती है एवं ठंडा पानी लगने में कमी आ जाती है।

13. क्या होगा यदि कोई नई जानकारी उपलब्ध हो जाती है?

कभी कभी एक अनुसंधान परियोजना/परीक्षण या शोध के दौरान नई जानकारी उपलब्ध हो जाती है। यदि ऐसा होता है तो आपके चिकित्सक आप को इसके बारे में बताएगे और आप के साथ चर्चा करेगे कि क्या आप इस अध्ययन में भाग लेकर इसे जारी रखना चाहतें है या नही। यदि आप अध्ययन में रहने का निर्णय लेते तो आपको एक नवीन सहमति पत्र पर हस्ताक्षर करने के लिए कहा जा सकता है। इसके अलावा नई जानकारी प्राप्त होने पर चिकित्सक आप के हित के लिए अध्ययन से वापस लेने के लिए कह सकते है।

14. क्या होता है जब अध्ययन बन्द हो जाता है?

अगर यह अध्ययन समय से पहले समाप्त हो जाता है तो इसकी पूरी जानकारी प्रतिभागी को दी जायेगी। कभी–कभी जो संस्था अध्ययन को आर्थिक रूप से सहायता प्रदान कर रही होती है उसकी मदद न करने से अध्ययन बन्द हो जाता है। अगर यह एक कारण है तो इसकी जानकारी प्रतिभागी को दी जायेगी।

15. क्या होगा अगर कुछ गलत हो जाता है?

अध्ययन मे शामिल होने के बाद यदि आपकी कोई शिकायत हो या कोई अप्रिय घटना घटित हो तो आप इसकी जानकारी/शिकायत अध्ययनकर्ता या संस्था की नैतिक समिति से कर सकते है। जिसकी जानकारी सूचना पत्र के अन्त मे दी गई है।

16. मेरे इस अध्ययन मे भाग लेने को गोपनीय रखा जाएगा?

अध्ययन के दौरान आप के बारे में एकत्र जानकारी कड़ाई से गोपनीय रखी जाएगी और कोई भी जानकारी है जो अस्पताल/ क्लिनिक और प्रयोगशाला से बाहर अगर जाती है तो उससे आपकी पहचान हटा ली जाएगी।

17. अध्ययन के परिणाम का क्या होगा ?

इस अनुसंधान का परिणाम भविष्य मे होने वाले किसी इलाज में मददगार साबित हो सकता है। इसके अलावा प्रकाशित होने वाले किसी रिपोर्ट/प्रकाशन में आपकी पहचान गुप्त रखी जायेगी।

18. इस अध्ययन को कौन आयोजित कर रहा है और इस परीक्षण के लिए धन कहॉ से आयेगा?

इस अध्ययन का आयोजन आंशिक तौर से शोधकर्ता के द्वारा किया जाएगा, किन्तु न्यूनतम चिकित्सीय शुल्क प्रतिभागी द्वारा देय होगा।

19. क्या सेवाये शोध खत्म हो जाने के बाद उपलब्ध रहेगी या नही ?

हॉ

20. इस अध्ययन का पुर्ननिरिक्षण किसने किया है?

इस अध्ययन की अनुमित हमारे संस्थान के विभाग प्रमुख एवं आई0ई0सी0 की समिति के सहमति से दी जाती है।

निम्न लोगा से सम्पर्क करें–

21. अधिक जानकारी के लिए?

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इस अध्ययन में भाग लेने के लिए प्रतिभागी को धन्यवाद।

प्रमुख अन्वेषक के हस्ताक्षर.....

प्रमुख अन्वेषककानाम .....

दिनांक.....

APPENDIX-VI

STATISTICAL TOOLS EMPLOYED

The following statistical formulae were used:

1. The Arithmetic Mean

The most widely used measure of central tendency is arithmetic mean, usually referred to simply as the mean, calculated as

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

2. The Standard Deviation

The standard deviation (SD) is the positive square root of the variance, calculated as

$$SD = \sqrt{\frac{\sum X_i^2 - \frac{(\sum X_i)^2}{n}}{n-1}}$$

where n= no. of observations

3. The Variance

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x-\bar{x})^2$$

where n= no. of observations

4. Paired t-test

$$t=d/\sqrt{(s^2/n)}$$

where d is the mean difference between two samples, s^2 is the sample variance, n is the sample size and t is a paired sample t-test with n-1 degrees of freedom.

5. Level of significance: "p" is level of significance

$p > 0.05$ = Not significant

$p < 0.05$ = Significant

$p < 0.01$ = Highly significant

$p < 0.0001$ = Very highly significant