

hydrocolloids compared with the smooth surface of elastomeric impression materials.

A major concern is the problem of disinfecting dental impressions, particularly irreversible hydrocolloid (hydrophilic) impressions. Irreversible hydrocolloid is a carbohydrate that imbibes water.

It has been demonstrated that surface deterioration occurs when irreversible hydrocolloids are immersed in antiseptic solutions. The use of disinfectant aerosol sprays does not adversely affect irreversible hydrocolloids but there is little evidence that exposure to a sprayed disinfecting agent is as effective as soaking.

The majority of available literature deals with the effects of disinfection on the impression materials. It was decided to conduct a clinical study for finding efficacy of cutasept® F disinfectant.

The efficacy of disinfectant depends on sufficient length of time & effective concentration of the disinfectant. The procedure that is recommended by the A. D. A. for disinfectants is to keep it in air tight container for recommended length of time. The minimum disinfection time for most surface disinfectants is 10 minutes.

Majority of the dental community is inclined to use short disinfection time. Watkinson<sup>16</sup> reported recently a survey of 40 U. K. dental teaching hospitals. Twenty-five (62.5%) of the respondents indicated that they routinely did no disinfection of impressions other than to rinse them in water. The 15 respondents (37.5%) who did practice some form of disinfection predominantly indicated disinfection time of 1 minute or less. Some dental professionals seem to neglect disinfection practice because of frustration over proposed disinfection time of 1 hour & more, which appear to contradict traditionally accepted ways for handling impressions, particularly irreversible hydrocolloid impressions.

This study evaluated the efficacy & effects of the spray disinfectant on the dimensional accuracy of commonly used five irreversible hydrocolloid impression materials.

It can be seen from the microbiologic report

of this study that the growth of microorganisms was checked with samples taken before & after disinfection. Blood agar used as culture media shows the growth of microorganisms before disinfection whereas there is no visible growth over culture media after disinfection.

The result of the studies obtained by Schuster G. S. Reggeberg F<sup>15</sup> revealed that spraying the impressions with sodium Hypochlorite (1:10 dilution, sealed in plastic bag for 10 minutes) eliminated all microbial growth on 13 out of 14 cases.

Several direct & indirect procedures have been used for the study of dimensional changes. The method employed in this study was indirect setting expansion of the die stone is a constant feature in the indirect evaluation.

The statistical analysis revealed hydrogum impressions material had less change as compared to all other impression materials. Vival, Kromopan & Polygel had minimal change which is not significant. The Zelgan imprint had significantly more change as compared to all other impression materials. It was noted that Cutasept® F disinfectant solution did not stain the impression.

Disinfection of dental impressions has drawn much attention and research interest in recent years. The majority of available literature deals with the effects of disinfection on the surface of impression materials. As we know the dimensional accuracy & surface details are the prime requisites for a good prosthesis. Hence we studied surface quality for smoothness & sharpness.

We found that average score for smoothness in all the impression material were in the range of 1.0 to 1.2 except 3.1 for Zelgan Imprint which is significantly more as compared to the others. Also, the average score of sharpness for Zelgan Imprint impression materials was 2.9 which is again significantly more as compared to all other materials.

### Conclusion :

This study was carried out to test the effects of Cutasept® F disinfectant on 5 different alginate impression materials. The effects were evaluated with respect to efficacy of spray, dimensional accuracy and

surface quality of stone casts that were obtained from the treated impressions. The following conclusions can be drawn from the findings :

This study has demonstrated the disinfection of irreversible hydrocolloid impression materials using Isopropanol and Benzalkonium Chloride spray. Spraying is effective against the growth of microorganisms present in oral cavity within 10 minutes.

The spray treatment for 10 minutes on Hydrogum, Vival, Kromopan and Polygel show minimal dimensional changes which is not significant statistically. But Zelgan Imprint shows significantly more dimensional changes.

Surface quality of stone cast is acceptable when Ultra Rock® die stone is used for pouring Hydrogum, Vival, Kromopan and Polygel impression within 15 minutes after gelation. However, Zelgan Imprint impression shows deterioration on the cast surface.

Spraying and storing the impression for 10 minutes is not a time consuming and difficult procedure for disinfection because it does not have to be premixed.

No staining of impression occurs as Cutasept® F is colourless.

## References :

1. Agar J. R., Law D. B. et al :  
An impression tray hanger for disinfection :  
J Prosthet Dent Dent. 1990 : 63 : 597 - 599
2. Bergman B., Bergman G. Olsson S. :  
Alginate impression materials, dimensional stability and surface detail sharpness following treatment with disinfectant solutions :  
Swed Dent J. 1985 : 9 : 255 - 262
3. Blair F.M. and R.W. Wassell :  
A survey of the methods of disinfection dental impressions used in dental hospital in the United Kingdom : Br. Dent J. 1996 : 180 : 369 - 375.
4. Blatterfein L., Payne S. H., Zarb G. A. :  
Avoiding cross-contamination in Prosthodontics :  
J. Prosthet Dent. 1981; 46 (3) : 120 - 122.
5. Center for Disease control  
US Dept. of Health, Education and Welfare, Hepatitis Surveillance, Report No. 41, 1977.
6. Cserna A., Crist R. L. et al :  
Irreversible hydrocolloids : A Comparison of antimicrobial efficacy :  
J. Prosthet Dent : 1994, 71 : 387 - 389.
7. Durr D. P. :  
Dimensional stability of alginate impressions immersed in disinfecting solutions :  
J. Dent. Child ; 1987 January-February : 45-48
8. Giblin J., Podesta R., White J :  
Dimensional stability of impression materials immersed in an iodophor disinfectant :  
Grant A. A., Walsh J. F. :  
Reducing cross-contamination in prosthodontics :  
J. Prosthet Dent 1975, 34 (3) : 324 - 328
9. Guidelines for infection control in the dental office and the commercial dental laboratory.  
J.A.D.A. : 1985, 110 : 969 - 972.
10. Herrara S P, Merchant V. A. :  
Dimensional stability of dental impression after immersion disinfection :  
J A D A : 1986, 113 : 419 - 421.
11. Kalpan B.A., Goldstein G.R. & Boulan R. :  
Effectiveness of a professional formula disinfectant for irreversible hydrocolloid :  
J Prosthet Dent : 1994, 71 : 603 - 606.
12. Merchant V. A. McNeight M.K. et al :  
Preliminary investigation of a method for disinfection of dental impression :  
J. Prosthet. Dent : 198, 52 : 877 - 879.
13. Ralph W.T., Gin S.L. Chedle DA, Harcourt JK:  
The effects of on the dimensional stability of alginate impression materials :  
1990, 35 : 514 - 517.
14. Schuster GS, Ruggeberg F :  
Disinfection and Distortion of Alginate Impression by Hypochlorite :  
J.D.R. : 1989, 69 : 242. (Abstract).
15. Watkinson AG :  
Disinfection of impression in UK Dental School  
Br. Dent. J. : 1988, 164 : 22 - 23.

Reprint request to : **Dr. Bhupal Y. Mane**

301, ii<sup>nd</sup> Bldg., 'A', Wing, Kapilavastu, Thane (W).



## Reduced Vertical Dimension - A Curse In Complete Denture Prosthesis

\*Dr. Puneet Kathuria

\*\*Dr. Sween Vij Kathuria

\*\*\* Dr. A.N. Patel

### Abstract :

The ramification of decreased vertical dimension in complete dentures prosthesis has a drastic effect on the function and esthetics of the patient. The case is presented to awaken the fellow dentists to pay due attention to the basic steps like vertical dimension in complete denture fabrication besides concentrating on using impressive materials and techniques, as we chase the next millennium.

### History :

A 66 year old male patient reported to the Prosthodontia O. P. D. at Govt. Dental College and Hospital, Ahmedabad with chief complaints of inability to chew the food and constant cheek biting. He also reported constant mild pain in TMJ region. Moreover, he was very much dissatisfied with esthetics of his denture which he got made just 3 months back.

### Examination :

On thorough intraoral and extraoral examination, it was found that there was ulceration of the buccal mucosa at the level of occlusal plane due to constant cheek biting. It was also found that the patient was unable to generate enough force for an efficient mastication (Fig. 1)

The soreness over the TMJ region was examined clinically, as well as radiographically to rule out any TMJ Pathology or dysfunction.

On examination of complete dentures it was found out that

- A) The freeway space was excessive by 9-10 mm.
- B) The lower occlusal plane was found to be about 3-4 mm above the relaxed upper lip line.



Fig. 1 : Patient wearing existing complete denture with deficient vertical dimension.



Fig. 2: Patient wearing complete denture with restored vertical dimension.

- C) The labial fullness was inadequate making upper lip have a "Purse String" appearance.
- D) The Nasolabial and Mentolabial sulci were very much accentuated giving a typical edentulous look

Govt. Dental College and Hospital, Ahmedabad

\* Former P.G. Student, Dept. of Prosthodontia

\*\* Former P. G. Student, Dept. of Conservative Dentistry

\*\*\* Prof. and Head, Dept. of Prosthodontia.

inspite of wearing the upper and lower complete dentures.

E) Patient had an extraordinary long upper lip length.

**The Irony of the situation** was that on individual assessment of the upper and lower complete dentures, any dental surgeon would not have doubted the capability of the denture to satisfy the esthetics and the functional needs of the patient.

Hence, it was concluded that vertical dimension of the complete denture was deficient by about 9-10 mm which could have led to all the associated problems in the patient. Since it was patient's first prosthesis and that too he wore for only 3 months off & on, it was decided to increase the vertical dimension by 9-10 mm. Had the patient being wearing the prosthesis for a longer period of time, it would not have been advisable to increase the V.D. more than 0.5-1 mm at a time for an extended period of time.

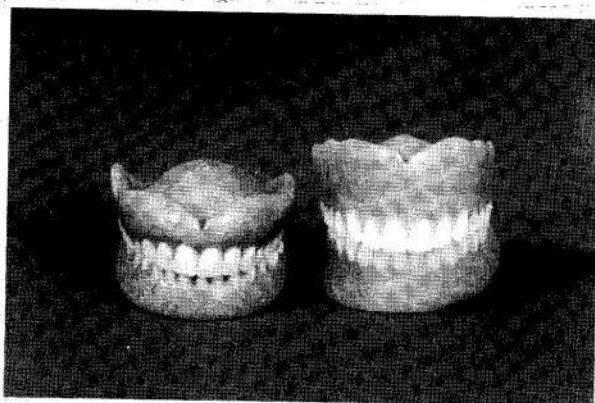


Fig. 3 : Comparison of the existing (left) and new (right) complete denture regarding the vertical dimension.

#### **Prosthodontic Management :**

##### **STEP - 1 :**

The patient was instructed to remove the upper and lower complete denture from the mouth for about 7-10 days to allow the healing of the ulcers. He was supplemented with Vit. B complex and mouth wash rinses for the same duration.

##### **STEP - 2 :**

Patient was kept on the soft, nutritional diet and was advised muscle relaxants (tab. myospas 1 T. DS. X. 7 Days) for TMJ soreness.

##### **STEP - 3**

The upper and lower complete dentures were used as

a special tray to make the final impressions and all the subsequent steps of complete denture fabrication were done.

##### **STEP - 4:**

Special attention was given to restore the appearance of the patient as required. During jaw relation recording and final trial.

##### **STEP - 5**

The deficient vertical dimension of the patient was restored (Fig. 2) and patient could immediately feel

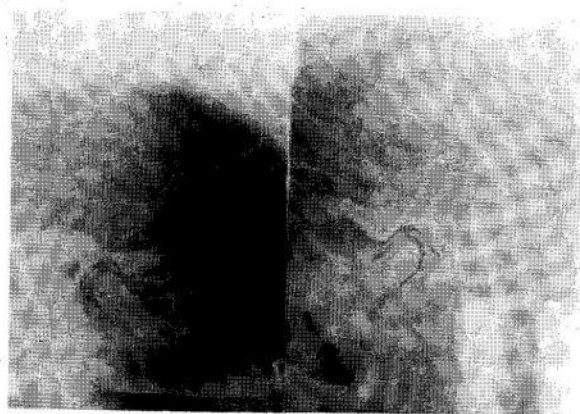


Fig. 4: Transcranial view of TMJ with the earlier complete dentures in mouth.

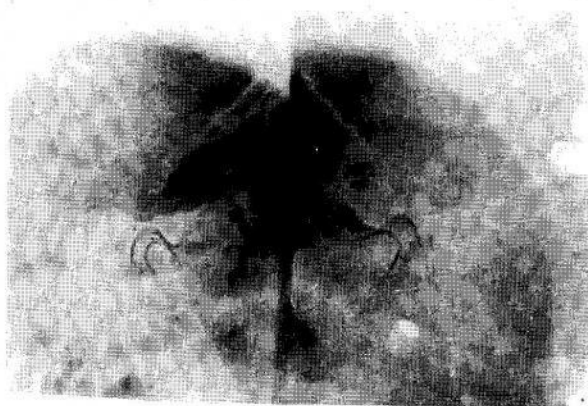


Fig. 5: Transcranial view of TMJ with the complete denture in mouth and V. D. restored.

the difference between the chewing efficiency before and after the prosthodontic management. (Fig.3)

##### **STEP - 6:**

The patient was recalled after 15 days, 1 month and 3 months and was checked for his earlier complaints.

##### **STEP - 7:**

A transcranial view of TMJ was taken to check for the comparison of condylar position in the glenoid fossa,

with the earlier (Fig. 4) & present complete denture prosthesis (Fig. 5)

### **Conclusion :**

It was concluded that the reduced vertical dimension had led to earlier problems regarding the functional and esthetic inadequacies which when corrected led to the desired results. In our constant quest for better materials and newer dental techniques, we should not overlook but emphasise the significance of the basic

steps like the vertical dimension which is so critical for the success of any prosthesis. This article should be a reminder to all the fellow dental surgeons regarding this basic step.

### **References :**

1. Boucher's Prosthodontic treatments for edentulous patient. 9th ED.; C.B. S. publications.
2. H. R. B. Fenn, K. P. Liddelow, ap gimso: clinical dental prosthetics. 1st ED., Aitbs publications.

### **Abstract**

#### **Wear Behaviour of Precision Attachments**

Manfred G. Wichmann, Witold Kuntze

In J. Prosthodont 1999, 12 : 409 - 414

#### **Purpose :**

The purpose of this article was to compare the wear behaviour of precision attachments.

#### **Material and Methods :**

In a comparative study attachments of various designs were subjected to alternating load cycles in a wear simulator. In addition to conventional adjustable attachments with plastic inserts were investigated for the first time. In each wear test 10,000 separating and joining movements were performed in an axial direction under a continuous spray of artificial saliva at 37°C.

#### **Results :**

The attachments with metal surfaces showed a rapid loss of approximately 60% of the required separating/joining forces during the first 1,000 cycles; after a further 9,000 cycles these forces fell to 25% and 35% respectively, of the initial value. The attachments with plastic inserts, by contrast, showed only a 4% and 8% loss respectively, of the required separating joining forces even after 10,000 wear cycles. With one attachment type a reproducible 20% increase of retention occurred during the testing

#### **Conclusion :**

The precision attachments with plastic female inserts showed only negligible amounts of wear and the most consistent retentive force in comparison with conventional precision attachments consisting of metal-alloy matrix and patrix components.



## Evaluation Of Radiographic Predictors To Assess The Rate Of Mandibular Residual Ridge Resorption

### Part - 1

Dr. G. K. Mahapatra\*

Dr. O. P. Nar\*\*

Dr. S. N. Joshi\*\*\*

#### Abstract :

Sixty clinically healthy edentulous patients were chosen for the study. One panoramic and one lateral cephalometric radiographs were taken of each patient. The amount of bone loss was estimated from the panoramic radiographs as per the formula proposed by Weical and Swoope.<sup>7</sup> The rate of mandibular RRR expressed as percentage of bone loss per year was then computed. The correlation between the rate of mandibular RRR and gonial cortical thickness and percentage of cortical bone at the symphysis was tested. These parameters were also compared between the male and the female patients.

This part of study is in reference to cortical thickness at gonion and the rate of mandibular RRR. In the second part, the relation between the percentage of cortical bone at the symphysis and the rate of mandibular RRR will be described.

The residual ridge resorption (RRR) of jaws is a chronic, progressive, irreversible and disabling disease. It is postulated the RRR is multifactorial biomechanical disease that results from a combination of various co-factors such as anatomic, metabolic and mechanical determinants.<sup>2</sup> Until more is known about it is aetiology, the ultimate goal of control or prevention is delayed. The prediction of mandibular RRR is therefore important for prospective implant patient and in conventional complete denture patients.

#### Review of literature :

Wical and Swoope (1974)<sup>7</sup> studied 130 panoramic radiographs and established the mean ratio between the total height of the mandible and height of the lower edge of mental foramen as 2.90: 1 with a standard deviation of 0.23 (vide the diagram No. 1). Bras et al. (1982)<sup>3</sup> conducted a study of mandibular angular cortex thickness on panoramic radiographs of 180 normal individuals. They found no distinct cortical layer upto 10 years in both male and female children. Between 10 and 14 years of age a small cortical layer was infrequently found. In the age range from 15 to 59 years the thickness of the mandibular angular cortex was relatively constant (1 - 25 mm. with an average of 1.56 mm.) and there was no significant difference between the sexes. In another study Bras et al. (1982)<sup>4</sup> found correlations between mandibular angular cortex and histologic grading of renal osteodystrophy, based on iliac crest biopsy. In severe renal osteodystrophy, the gonial cortical thickness was found to range between 0 to 0.5 mm, while in patients with insignificant renal osteodystrophy the cortical thickness was found to be between 0.8 to 2.2 mm. The same authors (1983)<sup>5</sup> concluded that if the further studies confirmed the relationship of RRR with mandibular angular cortex thickness, it would be a simple procedure for detection of high risk groups of severe RRR.

\* MDS student (1994-1997),

\*\* Principal and Head of Prosthodontics,

\*\*\* Late Professor of Prosthodontics in Punjab Govt. Dental College and Hospital, Amritsar - 143001

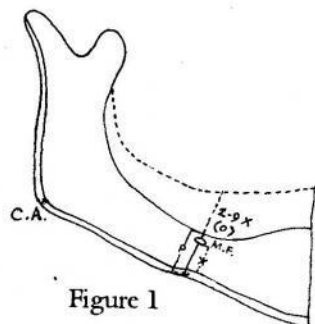


Figure 1

Diagrammatic representation of various landmarks and measurements on the panoramic radiographs:

- The distance from the lower edge of mental foramen (MF) to lower border of mandible was in mm and termed 'X'
- The original height of mandibular bone before extanction (O) was estimated by multiplying 'X' with 2.9
- The present height of mandibular bone (I) was also measured
- The amount of bone loss was calculated by subtracting 'p' from 'O'
- The thickness of cortex at the gonion (CA) was measured on bothe the sides

### Material and methods :

The study was conducted on 30 female

(Group - 1 ) and 30 male (Group - II ) edentulous patients. The subjects were selected for the study out of the patients visiting the "out patient department" of Prosthetics Dentistry of Punjab Govt. Dental College and Hospital, Amritsar. The medical and dental history of the patients were recorded and the patients who had no history of metabolic disease were selected for the study.

One panoramic radiograph and one lateral cephalometric radiograph were taken of each patient following the standardized procedures with the help of a Panex EC cephalostat machine.

### Tracing of the X-ray films :

Tracing paper of 0.00..3" thickness was used. Each panoramic radiograph was traced for the upper and lower borders of mandible and the mental foramina. The gonial cortex was traced on both sides of the panoramic radiograph and on right gonial cortex (closest to the X-ray film) of the lateral cephalometric radiographs.

### Measurements :

The vertical distance (X) between the inferior of mental for a men and inferior border of mandible was measured with the help of a transparent scale. The original mandibular bone

Table No. 1 : Mean values and standard deviations of different parameters

Parameters	Cortical thickness at gonion (Panoramic)		Cortical thikness at gonion (Cephalometric)		Rate of RRR (% bone loss per year)	
	Mean in mm.	Standard Deviation	Mean in mm	Standard Deviation	Mean	Standard Deviation
Female patients (G-I)	1.159	0.189	1.064	0.198	3.665	1.271
Male patients (G-II)	1.350	0.267	1.220	0.256	5.398	1.637

Table No. 2 : Value of "Student's-" for mean differences between the female and the male patients

Parameters	Cortical thickness at gonion (Panoramic)	Cortical thikness at gonion (Cephalometric)	Rate of RRR (% bone loss per year)
t - value	3.194	2.642	4.578
S/N.S.	S	S	S

S - Statistically significant

N.S. - Statistically non - significant

height (O) before extraction of teeth was estimated by multiplying 'X' with 2.9. This formula was proposed by Wical and Swoope in 1974.<sup>7</sup> The present mandibular bone height (P) was measured from upper border of mandible to lower border through the mental foramen. Measurements were taken on both the sides and the mean was calculated. The amount of bone loss was assessed by subtracting 'P' from 'O'. The amount of bone was then calculated as a percentage of original bone height to compensate for the magnification caused in panoramic radiographs. The percentage of bone loss was then divided by number of years of edentulousness to obtain the rate of mandibular RRR in percentage bone loss per year. The gonial cortical thickness was measured on both the sides and the mean was calculated. The right gonial cortical thickness was measured from the cephalometric radiographs. All the observations were taken thrice and the mean value was taken as the final measurement. The readings of the female and the male patients were recorded separately.

The association between the rate of mandibular RRR and gonial cortical thickness was tested by Pearson's correlation coefficient method. The two parameters were compared between men and women cases by "Student's-t" test.

### Result :

The mean rate of RRR which was expressed as percent bone loss per year, was found to be less in female patients ( $X=3.665$  mm.) as compared to that in male patients ( $X=5.398$  mm.) as compared to that of male patients ( $X=1.350$  mm.)

The above parameters were compared between the male and female cases by "Student's-t" test. The t-value was found to be statistically significant when the RRR was compared between the two groups. Statistically highly significant t-value was also obvious when gonion cortical thickness as measured from panoramic radiographs was compared between group - I and group - II patients.

Pearson's correlation coefficient was used to test whether the variables studied were correlated. The r-values showed a statistically significant indirect correlation between the rate of RRR and gonial cortical thickness as measured from the panoramic radiographs and the lateral cephalographs in both female and male patients. The term correlation implies that if one parameter increases, the other parameter tends to decrease.

### Discussion :

The mean rate of mandibular RRR expressed as percent bone loss per year was found to be much less in the female patients ( $X=3.665$ ) as compared to that of the male patients ( $X=5.398$ ). The difference in the measurements was statistically highly significant. At Wood and Coy in 1971<sup>1</sup> reported a slightly higher rate of RRR in men. Their study was based on a combination of lateral cephalometric and densitometric procedure and rate of RRR was estimated by superimposing the lateral cephalographs. Leong et al. (1992)<sup>6</sup> reported statistically significant higher rate of mandibular RRR in male patients ( $X=3.97$ ) as compared to that of the female patients.

The mean gonial cortical thickness was found to be less in the female patients ( $X=1.159$ mm) as compared to that of the male patients ( $X=1.350$ ); the difference being statistically highly significant. This finding is in agreement with the report of Leong et al in 1992. However Bras et al<sup>3</sup> found no significant difference in gonial cortical thickness in male and female patients in the age range of 15 to 59 years.

In this study, the correlation between the rate of mandibular RRR and the gonial cortical thickness was found to be statistically significant and indirect. However Leong et al.<sup>6</sup> found no such correlation in their study between the above parameters.

### Summary and conclusion :

The values of "Student's - t" for mean



Figure 2

The arrow marks show the mental foramina and the cortex at the mandibular angle as seen in a panoramic radiograph.

differences between the female and the male patients with respect to the rate of mandibular RRR and the cortical thickness at the gonion were found statistically significant (vide Table No. 2). Hence the sex of the patients must be considered when these parameters are to be evaluated.

The rate of mandibular RRR, expressed as percentage of bone loss per year, was found to be indirectly correlated with the cortical thickness at gonion as measured from the panoramic and the lateral cephalometric radiographs. However further studies are needed to confirm this finding because there has not been constant result by the different investigators.

#### Selected bibliography :

1. Atwood DA and Coy WA: Clinical, cephalometric and densitometric study of reduction of residual ridges - J. Prosthet. Dent. Sept. 1972, 26(3) : 280-295.
2. Atwood DA: The problem of reduction of ridges (Ch-3) in Essentials of Complete Denture Prosthodontics, 1988, PSC Publishing Company Inc. Littleton Massachusetts, pp - 22-38.
3. Bras J, Ooij CP, Abraham - Inpijin L, Kuser GJ, Wilmink JM: Radiographic interpretation of the mandibular angular cortex: A diagnostic tool in metabolic bone loss. Part I: Normal state. Oral Surg. May 1982, 53(5): 541-545.
4. Bras J, Ooij CP, Abraham - Inpijin L, Kuser GJ, Wilmink JM: Radiographic interpretation of the mandibular angular cortex : A diagnostic tool in metabolic bone loss. Part II : Renal Osteodystrophy, Oral Surg. June 1982, 53 (6) 647-650.
5. Bras J, Ooij CP, DunsJY, Wansink HM, Driessen RM, Akker HPVD: Mandibular atrophy and metabolic bone loss. Int. J. Oral Surg. Oc. 1983, 12: 3.9-313
6. Leong IT, Slabbert JCG, Becker JP: The value of radiographic predictors of the rate of mandibular residual ridge resorption. J. Prosthet. July 1992, 68 (1): 69-73
7. Wical KE, Swoope CC: Studies of residual ridge resorption Part - I: Use of panoramic radiographs for evaluations and classification of mandibular ridge resorption . J. Prosthet. Dent. July 1974. 32 (1): 7-12.

Reprints request to :

**Dr. G. K. Mahapatra**

142A, Pocket 'F', G.T. B Enclave, Delhi - 110093.