

# Minocycline

. . . .

I.

가

가

가

1970

가

12 14).

metronidazole, tetracycline,

1 3).

minocycline

가

,

Goodson

가

(1979)<sup>19)</sup>

cellulose acetate

20% tetracycline

4 12).

3가

가 24

,

,

가

48

가

8 14)

20). metronidazole 21 27) Newman (1984)<sup>21)</sup> 0.5% metronidazole dialysis tubing 40% metronidazole acrylic strip 가

, Addy (1984)<sup>22)</sup> 40% metronidazole acrylic strip metronidazole tetracycline 가

, Hitzig (1994)<sup>23)</sup> 5% metronidazole collagen 가

Stoltze (1992)<sup>24)</sup> 25% metronidazole monoglycerides triglycerides 가

가 tetracycline Lindhe (1979)<sup>28)</sup> 450ug/ml tetracycline 가

Goodson (1985)<sup>29)</sup> 25% tetracycline monolithic fiber 가

Minabe (1989)<sup>30)</sup> tetracycline collagen (placebo) tetracycline carrier minocycline strip gel 가

Tonetti (1990)<sup>31)</sup> 25% tetracycline ethylene vinyl acetate P. gingivalis, P. intermedia, P. nucleatum, C. rectus 가 minocycline gel 1 가

Christersson (1993)<sup>33)</sup> 10% tetracycline 가

Minocycline (1991)<sup>40)</sup> 30% minocycline polycaprolactone film 가

Okuda (1992)<sup>41)</sup> (minocycline microencapsulated biodegradable polymer) 가

Steenberghe (1993)<sup>42)</sup> 2% minocycline lipid gel 가

가 carrier loading

(1)

split-mouth design

Minocycline strip  
가 gel

2가

(0 )

가

30% minocycline strip( )  
2% minocycline gel(Sunstar Co., Japan)

4

1

4

II.

6, 10, 14, 20

1.

3 1/4 2

(2)

가 5-8mm

1. (Sliness and Löe)

가 30 ( 16,

0 : 가

14) , minocycline

1 : 가

cline tetracycline

2 :

3 NSAIDs(non-steroidal antiinflammatory drugs)

가

5

tetracycline

3 : 가

cyclosporin , phenytoin, nifedipine,

1

2.

William's 14W probe

가

class II

mm

6

가

3. (Mühlemann and Son)

2.

0 :

1 : phologic category)

2 : 0.85%

3 : , 1000

4 : , , 5

5 : , 1

4. (4)

William's 14W probe / two-way ANOVA test Duncan's Multiple Range Test

(3) III.

1. (P. gingivalis, P. intermedia, A. actinomycetemcomitans) 1.

Peptidase activity(N-benzyloxycarbonyl-glycyl-glycyl-L-arginylpeptidase) 30 ( 16, 14) , 540 25

Periocheck Test(Sunstar Co. Japan) ( 12, 13), 450

43.7 . 4 1

cotton balls

Paper points 30 18 .

37 ° C

water bath 15 2.

(1)

2. 6

Listgarten Helden(1978)<sup>3)</sup> (0 )

Cocoid cell, Straight rod, Curved rod, Fusiforms, Filaments, small spirochetes, Intermediate spirochetes, Large spirochetes, Motile rods 9가 (mor- (p<0.001) 20 (0 ) 6, 10, 14, 20

1 Comparison of Plaque Index for each week compared with baseline values

Group \ Week	0	6	10	14	20
Mino. strip	2.48 ± 0.50	0.30 ± 0.46	0.11 ± 0.32	0.11 ± 0.32	0.17 ± 0.33
Control	2.48 ± 0.50	0.22 ± 0.50	0.22 ± 0.42	0.14 ± 0.19	0.16 ± 0.35

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

by two way ANOVA Test

2 Comparison of Plaque Index for each week compared with baseline values

Group \ Week	0	6	10	14	20
Mino. gel	2.65 ± 0.48	0.38 ± 0.49	0.04 ± 0.19	0.08 ± 0.27	0.12 ± 0.32
Control	2.46 ± 0.64	0.35 ± 0.56	0.19 ± 0.40	0.08 ± 0.27	0.12 ± 0.32

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

by two way ANOVA Test

strip gel 가 20  
(p>0.05).

가

(2)

minocycline strip 가

6.13mm 6 3.67mm 가 6, 10, 14, 20

6.02mm 4.27mm , (p<0.001)

minocycline gel 6.18mm strip gel

6 4.00mm 6.01mm .

4.31mm . 6

3 Comparison of Probing Pocket depth for each week compared with baseline values

Group \ Week	0	6	10	14	20
Mino. strip	6.13 ± 1.34	3.67 ± 1.28	3.39 ± 1.21	3.29 ± 1.07	3.29 ± 1.07
Control	6.02 ± 1.26	4.27 ± 1.56	4.05 ± 1.56	4.07 ± 1.58	4.11 ± 1.59

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

Statistically significantly differences between intergroups(P<0.001)

by two way ANOVA Test

4 Comparison of Probing Pocket depth for each week compared with baseline values

Week	0	6	10	14	20
Mino. gel	6.18 ± 1.38	4.00 ± 1.42	3.50 ± 1.15	3.38 ± 1.16	3.36 ± 1.18
Control	6.01 ± 1.17	4.31 ± 1.35	4.12 ± 1.38	4.15 ± 1.42	4.15 ± 1.36

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

Statistically significantly differences between intergroups(P<0.001)

by two way ANOVA Test

(3) minocycline strip 3.09 6 strip 0.67mm  
 0.19 , 3.04 1.22 6 2.02mm , 0.78mm  
 gel 3.03 0.27 , 1.97mm 가 gel  
 2.96 1.15 . 20 0.66mm 1.92mm , 0.77mm  
 가 strip 0.63, 1.96 mm 가  
 1.85 가 gel 0.62 , 20  
 1.85 가 가 .  
 (0 ) 6, 10, 14,  
 20 20 가  
 (p<0.001) strip gel  
 6, 10, 14, 20  
 가 3.  
 (p<0.001) strip gel (1)  
 strip 1.77 6 0.19

5 Comparison of Sulcular Bleeding Index for each week compared with baseline values

Week	0	6	10	14	20
Mino. strip	3.09 ± 0.48	0.19 ± 0.39	0.22 ± 0.50	0.48 ± 0.65	0.63 ± 0.68
Control	3.04 ± 0.19	1.22 ± 0.57	1.33 ± 0.67	1.52 ± 0.80	1.85 ± 0.90

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

Statistically significantly differences between intergroups(P<0.001)

by two way ANOVA Test

6 Comparison of Sulcular Bleeding Index for each week compared with baseline values

Group \ Week	0	6	10	14	20
Mino. gel	3.03 ± 0.21	0.27 ± 0.54	0.35 ± 0.48	0.50 ± 0.58	0.62 ± 0.63
Control	2.96 ± 0.19	1.15 ± 1.01	1.35 ± 0.99	1.63 ± 0.85	1.85 ± 0.83

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

Statistically significantly differences between intergroups(P<0.001)

by two way ANOVA Test

7 Comparison of Sulcular Bleeding Index for each week compared with baseline values

Group \ Week	0	6	10	14	20
Mino. strip	0.67 ± 0.78	2.02 ± 0.80	2.09 ± 0.93	2.11 ± 0.91	2.13 ± 0.88
Control	0.78 ± 0.80	1.97 ± 0.68	2.09 ± 0.74	2.13 ± 0.74	2.13 ± 0.79

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

by two way ANOVA Test

8 Comparison of Gingival Recession for each week compared with baseline values

Group \ Week	0	6	10	14	20
Mino. gel	0.66 ± 0.76	1.92 ± 0.75	2.12 ± 0.89	2.19 ± 1.01	2.19 ± 1.01
Control	0.77 ± 0.95	1.96 ± 1.20	2.19 ± 1.28	2.21 ± 1.37	2.23 ± 1.37

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

by two way ANOVA Test

1.74 0.93 (0 )  
 gel 1.74 0.21 6, 10, 14,  
 1.73 0.92 20  
 가 20 strip  
 0.36, 1.27, gel 0.43, (p<0.001) strip gel  
 1.32  
 6  
 20 가 (2)

9 Comparison of Periocheck Test for each week compared with baseline values

Week	0	6	10	14	20
Mino. gel	1.77 ± 0.42	0.19 ± 0.39	0.21 ± 0.32	0.26 ± 0.45	0.36 ± 0.46
Control	1.74 ± 0.44	0.93 ± 0.47	0.96 ± 0.51	1.11 ± 0.57	1.27 ± 0.62

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

Statistically significantly differences between intergroups(P<0.001)

by two way ANOVA Test

10 Comparison of Periocheck Test for each week compared with baseline values

Week	0	6	10	14	20
Mino. gel	1.74 ± 0.43	0.21 ± 0.45	0.26 ± 0.39	0.35 ± 0.44	0.43 ± 0.41
Control	1.73 ± 0.45	0.92 ± 0.62	1.03 ± 0.59	1.08 ± 0.68	1.32 ± 0.57

Values : mean ± S.D.

Statistically significantly differences at each intervals(P<0.001)

Statistically significantly differences between intergroups(P<0.001)

by two way ANOVA Test

11 Comparison of Bacterial Counts for each week compared with baseline values

Group	Minocycline gel group					Saline group				
	0w	6w	10w	14w	20w	0w	6w	10w	14w	20w
Coccioid	105 ± 9.7	41 ± 3.5	44 ± 5.6	49 ± 6.9	56 ± 7.1	102 ± 10.1	58 ± 6.2	66 ± 5.9	72 ± 4.5	77 ± 7.5
Straight rod	58 ± 4.6	11 ± 1.1	25 ± 5.7	31 ± 4.2	34 ± 5.7	57 ± 5.9	37 ± 5.9	42 ± 3.5	45 ± 4.8	52 ± 3.7
curved rod	43 ± 5.6	7 ± 2.4	8 ± 3.5	9 ± 3.7	11 ± 4.1	45 ± 4.4	24 ± 3.5	25 ± 2.3	26 ± 2.9	31 ± 6.3
fusiforms	29 ± 5.4	4 ± 1.8	5 ± 1.9	5 ± 2.1	8 ± 4.2	32 ± 4.4	5 ± 0.9	5 ± 1.3	13 ± 3.3	15 ± 2.4
filaments	51 ± 6.1	2 ± 0.6	15 ± 2.4	14 ± 4.5	25 ± 4.7	50 ± 6.3	8 ± 1.3	3 ± 4.2	26 ± 3.2	32 ± 3.7
small spirochetes	36 ± 3.4	4 ± 1.3	6 ± 1.5	7 ± 2.8	8 ± 1.9	37 ± 3.6	8 ± 2.3	13 ± 2.1	17 ± 3.0	23 ± 2.4
Inter. spirochetes	32 ± 4.3	3 ± 0.9	4 ± 1.1	5 ± 1.2	7 ± 2.2	29 ± 3.9	6 ± 2.4	11 ± 2.1	11 ± 2.3	15 ± 3.3
large spirochetes	29 ± 3.3	1 ± 0.7	1 ± 0.6	1 ± 0.6	1 ± 0.5	29 ± 4.1	8 ± 1.9	8 ± 1.2	11 ± 3.1	13 ± 3.4
motile rod	66 ± 5.5	4 ± 2.3	7 ± 1.8	17 ± 3.2	29 ± 4.7	63 ± 4.4	10 ± 2.1	18 ± 3.5	30 ± 4.9	42 ± 3.5

Values : mean ± S.D.

Statistically significantly differences between intergroups(P<0.001) by two way ANOVA Test

가

가

가

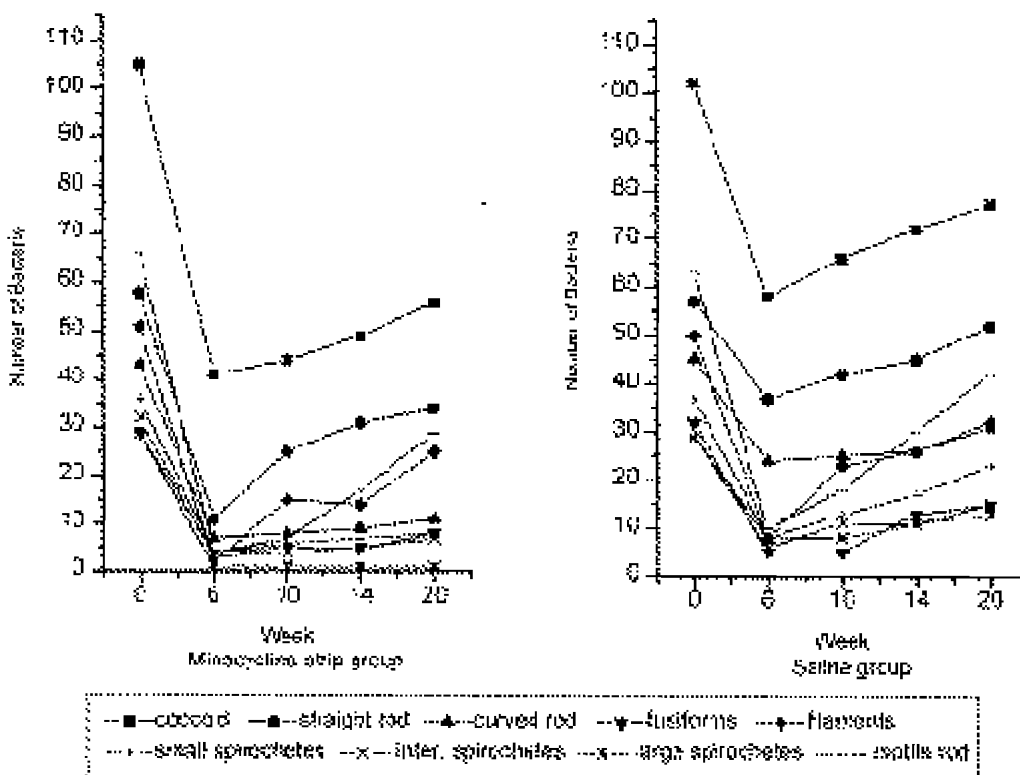


12 Comparison of Bacterial Counts for each week compared with baseline values

Group Week organisms	Minocycline gel group					Saline group				
	0w	6w	10w	14w	20w	0w	6w	10w	14w	20w
Coccioid	108 ± 9.7	39 ± 4.5	42 ± 5.3	52 ± 4.8	61 ± 6.2	101 ± 10.3	57 ± 7.1	61 ± 5.4	70 ± 4.8	78 ± 7.3
Straight rod	53 ± 5.1	7 ± 2.3	27 ± 4.8	34 ± 5.1	39 ± 6.3	59 ± 6.5	35 ± 6.4	41 ± 2.8	47 ± 5.6	52 ± 3.8
curved rod	47 ± 6.2	5 ± 3.3	8 ± 4.2	7 ± 5.0	13 ± 7.2	46 ± 5.3	25 ± 3.7	23 ± 1.9	27 ± 3.3	31 ± 7.1
fusiforms	25 ± 5.4	3 ± 2.1	5 ± 2.8	5 ± 2.5	7 ± 5.3	28 ± 4.2	4 ± 0.9	5 ± 1.1	15 ± 3.2	17 ± 2.9
filaments	53 ± 8.4	3 ± 2.6	10 ± 5.4	11 ± 5.6	13 ± 4.3	51 ± 7.2	7 ± 1.8	25 ± 4.5	27 ± 3.4	30 ± 3.9
small spirochetes	35 ± 3.7	3 ± 1.2	4 ± 1.9	4 ± 3.1	3 ± 1.6	34 ± 4.7	8 ± 2.5	13 ± 1.8	17 ± 3.0	22 ± 2.5
Inter. spirochetes	30 ± 4.5	4 ± 0.7	3 ± 0.9	3 ± 1.1	4 ± 2.1	31 ± 5.1	7 ± 3.1	10 ± 2.7	12 ± 2.2	15 ± 3.1
large spirochetes	32 ± 3.8	0.8 ± 0.5	1 ± 0.6	0.9 ± 0.6	1 ± 0.5	31 ± 5.6	7 ± 2.7	8 ± 1.5	11 ± 3.4	12 ± 4.1
motile rod	69 ± 6.5	3 ± 2.1	4 ± 1.7	11 ± 1.9	15 ± 4.2	66 ± 3.2	9 ± 1.4	20 ± 3.9	31 ± 5.0	43 ± 3.6

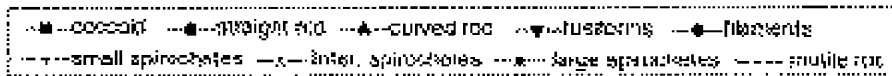
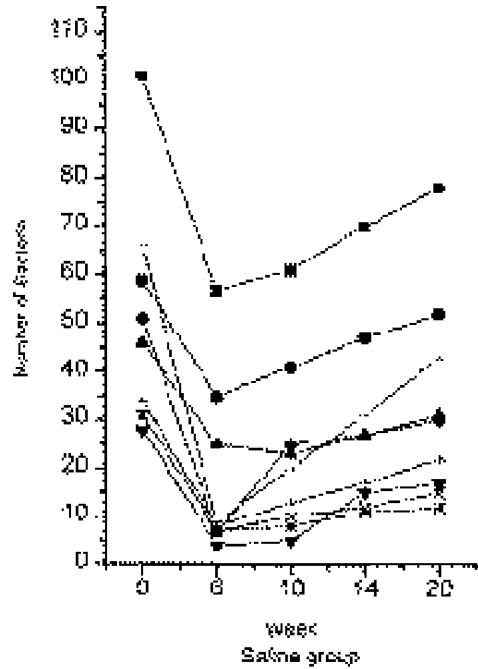
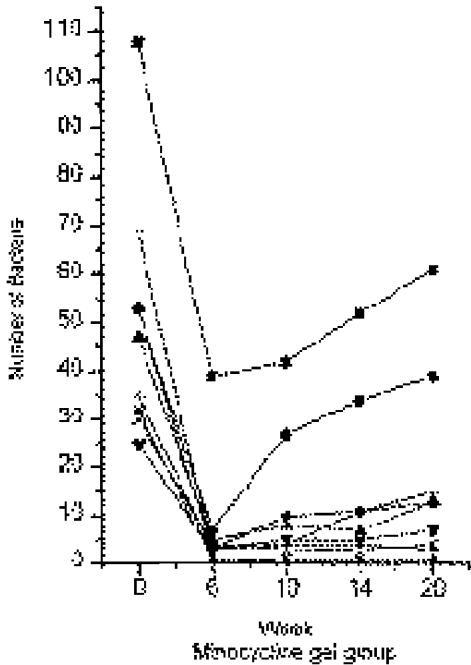
Values : mean ± S.D.

Statistically significantly differences between intergroups(P<0.001) by two way ANOVA Test



1 Change of number of bacteria variation on the group of minocycline strip

2 Change of number of bacteria variation on the group of saline irrigation



3 Change of number of bacteria variations on the group of minocycline gel

4 Change of number of bacteria variations on the group of saline irrigation

가  
(p<0.001) strip gel

가

IV.

가

가  
stratum spinosum

Steenberghe (1993)<sup>42)</sup> P. gingivalis, P. intermedius, A. actinomycetemcomitans  
가 가 가

가

가 Magnusson (1984)<sup>1)</sup>

가 2-4 가

, Listgarten Helden(1978)<sup>3)</sup>

가

가

minocycline Hcl 1967  
tetracycline 2

tetracycline

가

tetracycline

가

가

Tetracycline substantivity 가

622

(minimal inhibitory concentration)가 0.3ul/ml

doxycycline 4 가

tetracycline 13 가

tetracycline

metronidazole  
(1985)<sup>6)</sup>

가  
tetracycline, minocycline,  
4 7). Becker  
가 가 17가

tetracycline, minocycline, doxycycline,  
oxytetracycline, erythromycin

가 actinobolin, kanamycin,  
neomycin, streptomycin, spiramycin,  
tyrothricin, vancomycin, clindamycin, chloram-  
phenicol

nase

collage-

4

가 Penicillin

가 penicillinase

10, 40 50). minocycline

carbeni-

45). Okuda

cillin A. actinomycetemcomitans

(1992)<sup>41)</sup> minocycline HCl F.

tetracycline

nucleatum, E. corrodens, A. actinomycetem-  
comitans, P. intermedia, P. gingivalis, spiro-  
chetes, black-pigmented Bacteroides species

minocycline  
가

30S ribosomal subunit  
ribosome  
tRNA

mRNA-  
aminoacyl-  
(ataxia),

(vertigo, dizziness)  
 (vestibular disturbances)  
 minocycline HCl cline gel 2% minocy-  
 가 가  
 6  
 가  
 minocycline strip gel 6 가 20  
 가  
 strip gel  
 2mm strip  
 가 gel 가 strip  
 gel strip gel 가  
 strip gel 가 6, 10, 14, 20 (0 ) 가  
 strip gel 가 strip gel  
 Archie (1994)<sup>49)</sup> strip gel 가  
 minocycline HCl 가  
 가 가 DNA probe periocheck test 가 6  
 analysis P. gingivalis 20 가 (0 )  
 Saito (1994)<sup>33)</sup> strip gel strip gel  
 2% minocycline gel strip gel 가  
 Radvar (1996)<sup>44)</sup> (0 ) 6

가 가 20 minocycline  
가 strip gel .  
(1992)<sup>41)</sup>, Steenberghe (1993)<sup>42)</sup> 가 Okuda Somerman (1988)<sup>45)</sup>  
minocycline tetracycline  
가 minocycline efficacy 가  
20mg/ml  
가  
minocycline gel  
가  
가 가  
(1994)<sup>48)</sup> 30% minocycline  
polycaprolactone Ciancio (1980)<sup>8)</sup> minocycline  
200mg 가  
가 5 100mg  
8 2.3-  
3.5ug/ml <sup>42)</sup> minocycline strip 1  
가 4 가 1,319ug/ml, 7 899ug/ml, 8  
E. 553.4ug/ml <sup>29)</sup> minocycline  
gel 72 1ug/ml  
corrodens 2 , Black-pig-  
W. recta 4 , F. nucleatum  
mented Bacteroides 8  
(1990)<sup>46)</sup> 30%  
minocycline polycaprolactone  
7  
7  
minocycline strip gel  
Goodson (1994)<sup>7)</sup> 가  
tetracycline minocycline strip gel  
5-14ug/ml tetracycline  
fiber 1-20ug  
43ug/ml  
bacteria

1. minocycline strip

가

가

16).  
cline strip

30% minocy-

가

가

1

2. minocycline gel

가

minocycline gel

1

가

strip

가

가

3. minocycline strip

minocycline gel

가

가

carrier

가

VI.

V.

minocycline strip gel

가

가 5-8mm

가 1/4

2

25

. 0, 6,

10, 14, 20

(

,

(

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Vol.16 No.1, 1992.

## Effects of locally-delivered minocycline hcl on controlled periodontal disease

Mi-Hyun Chung, Young-Hyuk Kwon, Yeek Herr, Man-Sup Lee, Joon-Bong Park  
Department of Periodontology, College of Dentistry, Kyung-Hee University

The purpose of this study was to evaluate the clinical and microbiological outcomes following the use of 30% minocycline-loaded polycaprolacton film and 2% minocycline-loaded gel that was applied locally into pockets combined with scaling and root planing. 25 human subjects who were non-pregnant, non-lactating, aged 20-50 and diagnosed as moderate to advanced adult periodontitis were enrolled. Subjects were excluded if they had a history of severe acute or chronic systemic disease, if they required antibiotic prophylaxis for dental treatment for any reason, or if they reported a history suggestive of hypersensitivity reactions to minocycline or tetracycline. 4 quadrants that had several teeth with a 5-8mm probing pocket depth and radiographic evidence of alveolar bone loss for each patient were selected and divided into test sites and control sites according to the split-mouth design. Scaling and root planing was done for each site at baseline(0 week). Test sites received the minocycline gel and strip and control sites had saline irrigation. The patients received both treatments simultaneously. Subgingival irrigation of sterile saline was applied to the control sites for approximately 30 seconds. Minocycline strip and gel was applied into the periodontal pocket at 1, 2, 3, 4 weeks each after scaling and root planing in the test sites. The clinical and microbiological measurements were made at baseline and at the follow-up visits 6, 10, 14, 20 weeks.

The results of this study were as follows;

1. The sulcular bleeding index, probing pocket depth and Periocheck test was significantly reduced and the relative proportions of spirochetes and motile rods were significantly reduced and the proportion of cocci was correspondingly increased, in locally delivered minocycline strip group compared to saline irrigation group.
2. In locally delivered minocycline gel group, The effect was the same with minocycline strip group as compared with saline irrigation therapy.
3. There was no significant differences between minocycline strip group and minocycline gel group.

In conclusion, minocycline HCl local drug delivery combined with scaling and root planing may

provide added improvement of clinical and microbiological responses by inhibiting bacterial recolonization of treated sites. It is suggested that the local administration of minocycline-HCl in the periodontal pocket is effective when combined with subgingival mechanical debridement.