

1 . 1 . 1 . 1 . 2 . 1 . 1 . 1

1
2

I. 가 PGE₂

가 12-16).

Tetracycline

collagenase

1-4).

가 17-19),

가

12).

Sanguinaria extract²⁰⁾

가

. in vitro

chlorhexidine

가

21).

5),

(Magnoliae cortex)
tus) magnolol

(Zizyphi fruc-
tus) honokiol

Streptococcus mutans

가

22,23),

6-11).

Indomethacin,

Flurbiprofen, Naproxen

* 1997

(02-1997-248-0)

PGE₂
23-27),
가 , IL - 1

Stab culture method³²⁾
17g tryptone, 3g yeast
extract, 2.5g glucose, 5g NaCl, 2.5g
K₂SO₄, 0.5g sodium thioglycolate, 5Mℓ
hemin, 0.5mg menadion, 12g bacta agar

28), 9mm

가 29),
(Crassirhizomae rhizoma)
(Dryopteris crassirhizoma)

9mm, 5mm
chlorohexidine 200μℓ
37°C 3 - 7

“ 가
”
aspidin albaspidin

CO₂
vernier caliper
1mm

phloroglucinol

2.

30-31),
in
vitro study

rat 0.25%
trypsin - EDTA

well 1X10⁵

가

II.

Hank & balanced salt solu -
tion(HBSS)

1.

chlorohexidine

Actinobacillus. actinomycetemcomi -
tans., Capnocytophaga ochracea,
Streptococcus mutans, Porphyromonas
gingivalis, Prevotella intermedia,
Actinomyces viscosus, Fusobacterium
nucleatum 7

200μℓ가 95%,
37°C 24

chlorohexidine 0.2,
0.15, 0.1, 0.05%

MTT (methyl thiazol - 2 - YL - 2, 5 -
diphenyl tetrazolium bormide) 50μℓ
well 4 MTT
formazon
dimethyl sulfonide(DMSO) 50μℓ

가 . plate ELISA
 reader (THERMO max, Molecular
 devices, U.S.A.) 570nm 3. DNA
 tial medium (MEM) - minimum essen -
 well 가
 trypsinization 24 - well 1X10⁴
 - MEM 3

Table 1. Antibacterial effect to *A. actinomycetemcomitans* of chlorhexidine & *Crassirhizomae rhizoma*

sample	Cone.(%)	inhibition zone(mm)
Crassirhizomae rhizoma	0.2	22.7 ± 2.36
	0.15	18 ± 0.82
	0.1	15.7 ± 0.47
	0.05	15 ± 1.63
Chlorohexidine	0.2	24 ± 4.90
	0.15	21.8 ± 4.10
	0.1	21.7 ± 2.05
	0.05	18 ± 4.08

Table 2. Antibacterial effect to *C. ochracea* of chlorhexidine & *Crassirhizomae rhizoma*

sample	Cone.(%)	inhibition zone(mm)
Crassirhizomae rhizoma	0.2	21.3 ± 2.05
	0.15	18 ± 0.82
	0.1	17 ± 4.08
	0.05	15 ± 3.26
Chlorohexidine	0.2	31 ± 0.82
	0.15	28.7 ± 0.47
	0.1	26.3 ± 1.25
	0.05	24.7 ± 1.25

Table 3. Antibacterial effect to *S. mutans* of chlorhexidine & *Crassirhizomae rhizoma*

sample	Cone.(%)	inhibition zone(mm)
Crassirhizomae rhizoma	0.2	28 ± 0.82
	0.15	25 ± 2.45
	0.1	24 ± 1.63
	0.05	20.7 ± 0.94
Chlorohexidine	0.2	31 ± 2.45
	0.15	30 ± 1.63
	0.1	28.6 ± 2.49
	0.05	25 ± 3.26

Table 4. Antibacterial effect to *P. gingivalis* of chlorhexidine & *Crassirhizomae* rhizoma

sample	Cone.(%)	inhibition zone(mm)
<i>Crassirhizomae</i> rhizoma	0.2	33.3 ± 1.25
	0.15	31 ± 0.82
	0.1	27.3 ± 0.94
	0.05	23.7 ± 2.05
Chlorohexidine	0.2	41 ± 4.90
	0.15	36.3 ± 2.87
	0.1	33.3 ± 1.70
	0.05	29 ± 0.82

Table 5. Antibacterial effect to *P. intermedia* of chlorhexidine & *Crassirhizomae* rhizoma

sample	Cone.(%)	inhibition zone(mm)
<i>Crassirhizomae</i> rhizoma	0.2	30 ± 3.26
	0.15	27 ± 2.45
	0.1	25.3 ± 0.47
	0.05	20.7 ± 2.05
Chlorohexidine	0.2	32.3 ± 2.05
	0.15	27.7 ± 0.94
	0.1	24.7 ± 4.50
	0.05	21.7 ± 3.40

Table 6. Antibacterial effect to *A. viscosus* of chlorhexidine & *Crassirhizomae* rhizoma

sample	Cone.(%)	inhibition zone(mm)
<i>Crassirhizomae</i> rhizoma	0.2	28 ± 0.82
	0.15	23.7 ± 1.25
	0.1	21.7 ± 1.69
	0.05	19.7 ± 0.47
Chlorohexidine	0.2	27.3 ± 1.25
	0.15	24.3 ± 2.05
	0.1	21 ± 2.16
	0.05	16.3 ± 1.70

가 70% well 3Ml 5% trichloroacetic
 chlorohexidine, PDGF가 가 - acid(TCA) 가 4
 MEM 24 10 . 5% TCA
 , 2 well 5 μ 5% TCA 4
 Ci [3H]thymidine 가 1Ml 0.5N NaOH 가 37°C 30
 . 100 μl

Table 7. Antibacterial effect to *F. nucleatum* of chlorhexidine & *Crassirhizomae* rhizoma

sample	Cone.(%)	inhibition zone(mm)
Crassirhizomae rhizoma	0.2	20 ± 0.82
	0.15	16.7 ± 0.94
	0.1	14.3 ± 0.47
	0.05	10.7 ± 1.70
Chlorohexidine	0.2	32 ± 3.26
	0.15	28 ± 1.63
	0.1	27 ± 2.45
	0.05	24.7 ± 2.05

liquid scintillation counter(Beckam) DNA
 radioactivity
 III.

1. chlorhexidine
 Chlorohexidine 0.2, 0.15, 0.1, 0.05%
 A.actino - mycetemcomitans, C.ochracea, P.gingi - valis, P.intermedia, F.nucleatum, S.mutans, A.viscosus 7

Table 8. Cellular activity of gingival fibroblast of *Crassirhizomae* rhizoma & Chlorhexine

sample	Cone.(%)	Cellular activity(%)
control(- MEM)		100
Crassirhizomae rhizoma	0.2	22.18
	0.15	37.45
	0.1	94.64
	0.05	97.04
Chlorohexidine	0.2	39.93
	0.15	42.72
	0.1	45.10
	0.05	46.39

Table 9. Cellular effect of osteoblast of *Crassirhizomae* rhizoma & Chlorhexidine

sample	Cone.(%)	Cellular activity(%)
control(- MEM)		100
Crassirhizomae rhizoma	0.2	33.28
	0.15	61.27
	0.1	120.93
	0.05	111.45
Chlorohexidine	0.2	42.93
	0.15	43.97
	0.1	45.34
	0.05	45.98

가
A.viscosus 6 chlorhexidine - MEM
0.2% 0.15%
가 22.18%, 37.45%
. 0.1%, 0.05%
chlorhexidine 가 94.64%, 97.04%

(Table 1 - 7)

2. Chlorhexidine

. Chlorhexidine
0.2%, 0.15%, 0.1%, 0.05%
39.93%, 42.72%, 45.10%, 46.39%

(Table 8).

Table 10. Effect of Crassirhizomae rhizoma & Chlorhexidine on the [³H] thymidine incorporation into DNA of gingival fibroblast

sample	Conc.(%)	[³ H]	thymidine
incorporation(CPM)			
control(- MEM)			623
PDGF			650
	0.2		385
	0.15		430
	0.1		620
	0.05		632
Chlorohexidine	0.2		245
	0.15		275
	0.1		300
	0.05		310

Table 11. Effect of Crassirhizomae rhizoma & Chlorhexidine on the [³H] thymidine incorporation into DNA of osteoblast

sample	Cone.(%)	[³ H] thymidine incorporation(CPM)
control(- MEM)		2025
PDGF		2305
Crassirhizomae rhizoma	0.2	668
	0.15	1435
	0.1	2178
	0.05	2145
Chlorohexidine	0.2	440
	0.15	445
	0.1	448
	0.05	510

- MEM

0.2% 0.15%

가 33.28%, 61.275%

0.1%, 0.05%

가 120.93%, 111.45%

가

. Chlorhexidine

0.2%, 0.15%, 0.1%, 0.05%

42.93%, 43.97%, 45.34%, 45.98%

Chlorhexidine

(Table 9).

3. Chlorhexidine

DNA

5).

Actinobacillus.

actiomycetemcomitans., Capnocytophaga
ochracea, Strepto - coccus mutans,
Porphyromonas gingivalis, Prevotella
intermedia, Actinomyces viscosus,
Fusobacterium nucleatum

- MEM

, PDGF

0.2%

0.15%

DNA

, 0.1% 0.05%

Chlorhexidine

. Actinomyces viscosus

, Prevotella intermedia 0.1%

chlorhexidine

Chlorhexidine

DNA

(Table 10).

0.2% 0.15%

chlorhexidine

DNA

, 0.1% 0.05%

chlorhexidine

, Chlorhexidine

DNA

(Table 11).

가

IV.

growth factor가

PDGF - BB, IGF

가

가 36,37), BMP

가

38).

Chlorhexidine

, Gabler chlorhexidine
 가 100µg/Mℓ 가
 25µg/Mℓ
 33), Helgeland
 34), Mobacken 40
 µg/Mℓ
 가

35)
 Chlorhexidine 가

26)
 holokiol magnolol
 cytokine
 , 39)

cytokine
 , 40) Sanguinarine,
 listerin, 가

Chlorhexidine
 chlorhexidien
 가

, 가
 cytokine 가

V.

chlorhexidine
 가

1. Chlorohexidine
 Chlorohexidine

2. [3H] thymidine
 incorporation 0.1, 0.05%

VI.

1. Gemmell E, Seymour GJ :
 Modulation of immune response to
 periodontopathic bacteria. Curr Opin
 Periodontol 1994:28 - 38
2. Carranza FA : Glickman's clinical
 periodontology. 6th ed., The WB
 Saunders Co. 1894:361 - 390
3. Scransky SS : Microbiology of
 periodontal disease - present status
 and future consideration. J Periodontol
 1977 48:497 - 504
4. Newman MG : Current concepts
 of the pathogenesis of periodontal
 disease. Microbiology emphasis. J
 Periodontal 1985 734 - 739
5. Gjeremo P : Chlorhexidine and
 related compounds J Dent Res 1989
 68:1602
6. Greenstein G, Berman C, Jaffin R
 : Chlorhexidine. An adjunct to peri-
 odontal therapy. J Periodontol
 1986:57:370 - 377
7. Goldschmidt P, Cogen R
 Taubman S : Cytopathologic effects of
 chlorhexidine on human cells. J
 Periodontol 1977 48:212 - 215
8. Paunio K, Knuttia M, Lielityinen
 H : The effect of chlorhexidine glu-
 conate on the formation of experi-
 mental granulation tissue. J
 Periodontol 1978 49:92 - 97

9. Bassetti C, Tallenburger A : Influences of chlorhexidine rinsing on the healing of oral mucosa and osseous loss in beagles. *J Clin Periodontol* 1980 7:443 - 451
10. Gabler W, Bullock W, Creamer H : the influence of chlorhexidine on superoxide generation by induced human neutrophils. *J Periodont Res* 1987 22:445 - 458
11. Watts T, Addison T, Johnson B : Effects of chlorhexidine solution on neutrophil locomotion in vitro. *J Dent Res* 1989 17:287 - 295
12. Micheal B, Carol NB : Antimicrobial agents in prevention and treatment of periodontal disease. *Dent Clin North America* 1988:217 - 241
13. Williams RC, Jeffcoat MK, Howell TH, Rolla A, Goldhaber P : Altering the progression of human alveolar bone loss with the non-steroidal anti-inflammatory drug flurbiprofen. *J Periodontol* 1989 60:485 - 490
14. Jeffcoat MK, Williams RC, Reddy MS, English R, Goldhaber P : Flurbiprofen treatment of human periodontitis; Effect of alveolar bone height and metabolism. *J Periodont Res* 1988 23:381 - 385
15. Howell TH, Jeffcoat MK, Goldhaber P, Reddy MS, Kaplan ML, Johnson HG, Hall CM, Williams RC : Inhibition of alveolar bone loss in beagles with the NSAID naproxen. *J Periodont Res* 1991 26:498 - 501
16. Williams RC, Jeffcoat MK, Howell TH, Reddy MS, Johnson HG, Hall CM, Goldhaber P : Ibuprofen; An inhibition of alveolar bone resorption in beagles. *J Periodont Res* 1988 23:225 - 229
17. Vernillo AT, Ramamurthy NS, Golub LM, Rifkin BR : The nonantimicrobial properties of tetracycline for the treatment of periodontal disease. *Curr Opin Periodontol* 1994 1:111 - 118
18. Rifkin BR, Vermillo AT, Golub LM : Blocking periodontal disease progression by inhibition of tissue destructive enzymes: A potential therapeutic role for tetracycline and their chemically modified analogs. *J Periodontol* 1993 64:819 - 827
19. Terranova VP, Franzetti LC, Hirsch S : A biochemical approach to periodontal regeneration; Tetracycline treatment of dentin promotes fibroblast adhesion and growth. *J Periodont Res* 1986 21:330 - 337
20. Kopczyk RA, Abrams H, Brown AT, Mateny JL, Kaplan AL : clinical and microbiological effects of a sanguinaria-containing mouthrinse and dentifrice with and without fluoride during 6 months of use. *J Periodontol* 1991 62:612 - 622
21. Dzink JL, Socransky SS : Comparative in vitro activity of sanguinarin against oral microbial isolates. *Antimicrob Agents Chemother* 1985 27:663 - 665
22. Bae KH and Oh HR : Synergistic effect of lysozyme on bacterial activity of magnolol and honokiol against a cariogenic bacterium, *Streptococcus mutans* OMZ 176. *Arch Pharm Res* 1990 13:117 - 119

23. Namba T, Tsunozuka M, Bae KH, Hattori M : Studies on dental caries prevention by traditional chinese medicines. Shoykugaku Zasshi 1981 35:295 - 302
24. Osawa K, Matsumoto T, Yasuda H, Kato T, Naito Y, Yukna K : The inhibitory effect of plant extracts on the collagenolytic activity and cytotoxicity of human gingival fibrob -

- lasts by Porphyromonas gingivalis crude enzyme. The bulletin of Tokyo Dental College 1991 32:1 - 7
25. : 1992 22:515 - 526
 26. : Magnolol Honokiol , , cytokine 1993 23:145 - 158
 27. Chang BS, Lee YM, Ku Y, Bae KH, Chung CP : The antibacterial activities of magnolol and honokiol gainst periodontopathic microorganism. Planta Med 1998 64:367 - 369
 28. : 1997 27:165 - 178
 29. :
 30. 1987 500 - 501
 31. 1983 138 - 139
 32. Yamada M, Takazoe I, Okuda K : Bacteriocinogenicity of oral Bacteroids species Bull Tokyo Dent Coll 1987 28:55 - 61
 33. Gabler WL, Roberts D, Harold W : The effects of chlorhexidine on blood cells J Periodont Res 1987 22:150 - 155
 34. Helgeland K, Heyden G, Rolla G : The effect of chlorhexidien on animal cells in vitro Scand J Dent Res 1971 79:209 - 215
 35. Mobaken H, Wengstrom C : Interference with healing of rat skin incisions treated with chlorhexidine Acta Dematovener 1974 54:29 - 34
 36. Lynch SE, Castilla GR, Williams RC, Kiritsy CP, Howell H, Reddy MS, Antoniades HN : The effects of short - term application of a combination of platelet - derived and insulin - like growth factors on periodontal wound healing J Periodontol 1991 62:458 - 467
 37. Rutherford RB, Niekrash CE, Kennedy MF : Platelet - derived and insulin - like growth factors stimulate regeneration of periodontal attachment in monkeys J Periodont Res 1992 27:285 - 290
 38. Sigurdsson TJ, Lee MB, Kubota K, Wikesjo UME : Periodontal repair in dogs: recombinat human bone morphgenic protein - 2 sifnificantly enhances periodontal regeneration J Periodonol 1995 66:131 - 138
 39. : cytokine 1993 23:37 - 47

Key Words : natural extract, Chassizomae rhizoma, antibacterial effect, cytotoxicity,

40. , , , : - Abstract -

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Antibacterial Effects and Cytotoxicity of Crassirhizomae Rhizoma

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The purpose of this study was to evaluate the antimicrobial activity of Crassirhizomae rhizoma and its possible use as an oral antiseptics for prevention of periodontitis. Its antibacterial activity against periodontopathic microorganisms including Actinobacillus actinomycetem - comitans, Capnocytophaga ochracea, Streptococcus mutans, Porphyromonas gingivalis, Prevotella intermedia, Actinomyces viscosus, Fusobacterium nucleatum was evaluated via modified stab culture method. The cytotoxicity against gingival fibroblasts and rat osteoblasts was investigated via [³H]thymidine incorporation and cellular activity was investigated via MTT assay. Chlorhexidine was used as control group. Crassirhizomae rhizoma was prepared at concentrations of 0.2, 0.15, 0.1, 0.05%.

Chlorhexidine was also prepared at the same concentration. *Crassirhizomae* rhizoma showed lower antimicrobial activity against these microorganism than chlorhexidine, but this difference was not significant. And, *Crassirhizomae* rhizoma showed more cellular activity and less cytotoxicity than chlorhexidine on human gingival fibroblast and rat osteoblast. This study suggests that *Crassirhizomae* rhizoma might be a candidate for a safe oral antiseptic for the prevention and treatment of periodontal disease.