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2025 Volume 10, Issue 4
Advances in Precision Medicine
ISSN: 2424-9106 (Online)
ISSN: 2424-8592 (Print)

Minocycline Ointment Combined with Chlorhexidine Gargle in the Treatment of Elderly Patients with Chronic Periodontitis

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Abstract: *Objective:* To analyze the effect of minocycline ointment combined with chlorhexidine gargle in elderly patients with chronic periodontitis. *Methods:* 64 elderly patients with chronic periodontitis were selected and randomly divided into two groups from January to December 2024, with 32 patients in each group. The study group was treated with minocycline ointment combined with chlorhexidine gargle, and the control group was treated with compound iodine glycerin. *Results:* compared with the control group, the level of inflammatory factors in the study group after treatment was significantly lower, the periodontal clinical indicators after treatment were significantly lower, the treatment effect was significantly higher, and the score of oral health impact Scale-14 after treatment was significantly lower, $p < 0.05$. The levels of inflammatory factors, periodontal clinical indicators, and oral health impact Scale-14 scores before treatment were compared between the two groups, $p > 0.05$. *Conclusion:* the effect of minocycline ointment combined with chlorhexidine gargle in elderly patients with chronic periodontitis is ideal.
Keywords: Minocycline ointment; Chlorhexidine gargle; Old age; Chronic periodontitis; Treatment effect

Online publication: December 20, 2025

1. Introduction

The Department of Stomatology has a high incidence of chronic periodontitis, which is mainly characterized by periodontal pocket formation, gingival inflammation, alveolar bone absorption and loss of attachment. Its incidence is related to the long-term stimulation of dental plaque and dental calculus. Patients have loose teeth and fall off. Through the diffusion of inflammatory mediators, the patient's overall health is seriously affected. The risk of cardiovascular disease, diabetes and other basic diseases in elderly patients is increased, and the quality of life of the elderly group is seriously reduced [1]. For elderly patients with chronic periodontitis, their physiological function declines, their immune defense ability is reduced, and they are prone to be complicated with hypertension and diabetes. The implementation of conventional subgingival scaling (SRP) for patients has poor response, poor control of postoperative inflammation, and prone to relapse. In clinical research, minocycline ointment can maintain high concentration of antibacterial activity in patients' periodontal pockets after use, and effectively inhibit the growth of pathogenic bacteria [2]. In clinical research, chlorhexidine gargle has broad-spectrum antibacterial effect, and oral plaque colonization is reduced. The two have a synergistic mechanism. In this paper, 64 cases of elderly patients with chronic periodontitis were selected to analyze the effect of minocycline ointment

combined with chlorhexidine gargle.

2. Data and methods

2.1. Data

2.1.1. Methods

64 elderly patients with chronic periodontitis were selected from January to December 2024 and randomly divided into two groups with 32 patients in each group. The study group was 17/15 men and women, aged 61–78 (68.25 ± 4.25) years, and the control group was 18/14 men and women, aged 62–77 (68.24 ± 4.24) years. The comparison of the two groups of data showed that $p > 0.05$.

2.1.2. Inclusion criteria

In line with the diagnostic criteria of the disease; Informed consent; Not allergic to drug ingredients.

2.1.3. Exclusion criteria

Oral administration of relevant drugs or periodontitis treatment in recent 2 months; Severe organ diseases; Mental disorders; Mental retardation.

2.2. Method

The control group was treated with compound iodine glycerin, injected into the periodontal pocket, 0.1–0.2 mL/time, once a week, for 4 weeks. The study group used minocycline ointment combined with chlorhexidine gargle, filled the periodontal bag with minocycline ointment, rinsed with chlorhexidine gargle once a week, 10–20 mL each time, and rinsed after brushing teeth in the morning and evening for 4 weeks.

2.3. Observation indexes

(1) The levels of inflammatory factors in the two groups were compared.

(2) The periodontal clinical indexes of the two groups were compared.

(3) The therapeutic effects of the two groups were compared. The symptoms of gingival bleeding, redness and swelling were completely disappeared, without exudates, loose teeth, etc. the probing depth of periodontal pocket was reduced by more than 2 mm, which was judged to be effective; It can significantly relieve symptoms, improve tooth loosening, reduce exudates, and reduce the probing depth of periodontal pocket by 1mm or more, which is judged to be effective; In other cases, the judgment is invalid. Total effective rate = 100% – ineffective rate.

(4) The oral health impact Scale-14 scores of the two groups were compared. The total score is 56, and a lower score is healthier.

2.4. Data statistics

Statistical SPSS 28.0 software was used to complete the data calculation. The measurement data were described by $\bar{x} \pm s$, *t*-test, count data were described by % and χ^2 test, $p < 0.05$, there was statistical significance.

3. Results

Compared with the control group, the level of inflammatory factors in the study group after treatment was significantly lower, the periodontal clinical indicators after treatment were significantly lower, the treatment effect was significantly

higher, and the score of oral health impact Scale-14 after treatment was significantly lower, $p < 0.05$; The levels of inflammatory factors, periodontal clinical indicators, and oral health impact Scale-14 scores before treatment were compared between the two groups, $p > 0.05$ (see **Table 1**, **2**, **3** and **4**).

Table 1. Comparison of inflammatory factor levels between the two groups

Group	hs-CRP (ng/mL)		TNF-α (ng/mL)		IL-8 (ng/L)	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Research group (n = 32)	13.1 ± 4.1	4.7 ± 2.4	5.5 ± 1.4	2.6 ± 1.1	14.1 ± 2.5	7.5 ± 1.4
Control group (n = 32)	13.2 ± 4.2	7.1 ± 3.3	5.4 ± 1.6	3.5 ± 1.8	14.2 ± 2.5	9.1 ± 1.7
t	0.0964	3.3272	0.2661	2.4134	0.1600	4.1098
p	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05

Table 2. Comparison of periodontal clinical indicators between the two groups

Group	Probing depth PD (mm)		Sulcus bleeding index		Clinical attachment level (mm)		Plaque index	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Research group (n = 32)	5.7 ± 0.6	2.2 ± 0.3	3.7 ± 0.5	1.2 ± 0.2	4.8 ± 0.5	2.5 ± 0.3	3.6 ± 0.5	1.7 ± 0.3
Control group (n = 32)	5.6 ± 0.6	3.7 ± 0.5	3.8 ± 0.4	2.5 ± 0.1	4.7 ± 0.4	3.3 ± 0.4	3.7 ± 0.7	2.7 ± 0.2
t	0.6667	14.5521	0.8835	32.8877	0.8835	9.0510	0.6576	15.6893
p	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05

Table 3. Comparison of treatment effect between the two groups (%)

Group	Markedly effective	Effective	Invalid	Total effective rate
Research group (n = 32)	23 (71.88)	8 (25.00)	1 (3.13)	96.88
Control group (n = 32)	10 (31.25)	15 (46.88)	7 (21.88)	78.13
χ^2				5.1429
p				< 0.05

Table 4. Comparison of oral health impact Scale-14 scores between the two groups (points)

Group	Before treatment	After treatment
Research group (n = 32)	24.1 ± 2.7	8.8 ± 1.2
Control group (n = 32)	24.5 ± 2.8	16.7 ± 2.1
t	0.5817	18.4767
p	> 0.05	< 0.05

4. Discussion

In China, people over 60 years old are prone to chronic periodontitis, which has a high prevalence rate and can lead to tooth loosening and loss. For elderly patients, it is characterized by reduced salivary secretion and decreased immune function. Complications include hypertension and diabetes, which lead to deeper bacterial colonization in the periodontal pocket (mostly more than 5 mm), and it is easy to form "oral inflammation systemic basic disease" [3]. Analysis shows that the metabolites of periodontal pathogenic bacteria (such as endotoxin) activate systemic inflammation through blood circulation, which is manifested by increasing the levels of hs-CRP, TNF-α and other factors. Therefore, patients have significantly increased the risk of cardiovascular disease and diabetes glucose control.

At present, subgingival scaling (SRP) is mainly used to treat the condition of elderly patients with chronic periodontitis, but the elderly patients have problems such as slow tissue repair, incomplete bacterial clearance and so on, and the recurrence rate is more than 30%. The implementation of conventional adjuvant compound iodine glycerin for patients has problems such as narrow antibacterial spectrum (limited effect on anaerobic bacteria), short duration of action (weekly administration), and so on, which makes it difficult to meet the treatment needs of patients. Minocycline ointment and chlorhexidine gargle in clinical research. The former is a local slow-release antibiotic, and the latter is a broad-spectrum antibacterial agent. There is synergy in the mechanism of action, but there are few studies on its clinical application in the elderly population.

The core values of this study are analyzed as follows [4]:

(1) Patients were given precise treatment. The total effective rate of the study group was 96.88%, which was much higher than that of the control group. The results confirmed that the problems of poor immunity and poor effect of conventional treatment in elderly patients were solved.

(2) With the help of "oral and systemic health" management, the inflammatory factors such as hs-CRP and TNF-α in the study group were significantly reduced after treatment, which could significantly reduce the systemic inflammatory load of patients and provide support for the control of basic diseases.

(3) Fill in the research gap of the elderly group. At present, most of the research objects of periodontitis are young and middle-aged people, including 61–78 years old. The interference factors are eliminated, and the results are reliable, which provides the corresponding data support for the update of the diagnosis and treatment guidelines of periodontitis in the elderly.

Clinical practice has confirmed that the effect of minocycline ointment combined with chlorhexidine gargle in elderly patients with chronic periodontitis is ideal, and this study can provide evidence for it [5,6]. The experimental results of this group: compared with the control group, the level of inflammatory factors in the study group after treatment was significantly lower, the periodontal clinical indicators after treatment were significantly lower, the treatment effect was significantly higher, and the score of oral health impact Scale-14 after treatment was significantly lower, $p < 0.05$; the levels of inflammatory factors, periodontal clinical indicators, and oral health impact Scale-14 scores before treatment were compared between the two groups, $p > 0.05$. The specific analysis shows that:

(1) The targeted effect of minocycline ointment is analyzed. Specifically, minocycline ointment, as a tetracycline sustained-release preparation, can maintain the effective antibacterial concentration (>10 μg/mL) for 2–3 weeks after injection into the periodontal pocket of patients, which is higher than the minimum antibacterial concentration (< 1 μg/mL) of pathogenic bacteria. After the drug is used, it has broad-spectrum bactericidal effect. Combined with 30S subunit of bacterial ribosome, it can inhibit the protein synthesis of patients and effectively eliminate the core pathogenic bacteria such as Porphyromonas gingivalis. The drug can also help patients with anti-inflammatory and tissue protection, inhibit the activity of matrix metalloproteinases (MMPs), significantly reduce the destruction of periodontal collagen fibers and reduce the level of inflammatory factors released by macrophages [7].

(2) The whole oral bacteria control effect of chlorhexidine gargle is analyzed as follows: as a cationic surfactant, chlorhexidine gargle at a concentration of 0.12–0.2% can help patients quickly kill bacteria, destroy bacterial cell

membrane, and kill 90% of oral surface bacteria within 1 minute. In addition, the drug can inhibit the formation of plaque, combine with tooth surface mucin to form an “antibacterial membrane”, block bacterial colonization, and adapt to the characteristics of elderly patients with less saliva and rapid plaque formation. In addition, the drug is safe to use, and is not absorbed by oral mucosa. After long-term use, patients will not have obvious irritation. It is suitable for elderly patients with underlying diseases.

(3) After combined use, it can play a synergistic role, specifically as follows: form a “local deep sterilization + full oral breadth control” system, use minocycline for patients, can help patients remove deep pathogenic bacteria in periodontal pocket, solve the “focus core”, use chlorhexidine for patients, can effectively reduce the plaque on the patient’s tooth surface, tongue back and other parts, and prevent the migration of “peripheral bacteria” to periodontal pocket [8].

Analysis of the reasons for the results of this study:

(1) The reasons for the reduction of inflammatory factors: after treatment, hs CRP (4.7 ± 2.4 ng/mL), TNF-α (2.6 ± 1.1 ng/mL), IL-8 (7.5 ± 1.4 ng/L) in the study group were significantly lower than those in the control group, because “double anti-inflammatory” took effect. After the drug was used, the pathogenic bacteria in the patient’s mouth were removed, and the endotoxin stimulation of the patient was significantly reduced. On the other hand, it directly inhibited the release of inflammatory factors.

(2) The reasons for the improvement of periodontal clinical indicators: the periodontal probing depth (2.2 ± 0.3 mm), gingival sulcus bleeding index (1.2 ± 0.2), clinical attachment level (2.5 ± 0.3 mm), and plaque index (1.7 ± 0.3) of the study group were better than those of the control group. Analysis of the reasons showed that minocycline could promote the attachment of periodontal ligament fibers, reduce the permeability of gingival capillaries, inhibit the activity of MMPs, and reduce the destruction of collagen. Chlorhexidine could continuously inhibit the plaque of patients.

(3) The reasons for the improvement of the total effective rate of treatment: 23 cases were markedly effective and 1 case was ineffective in the study group, while 10 cases were markedly effective and 7 cases were ineffective in the control group. Minocycline used for patients can have long-term antibacterial and anti-inflammatory effects, and the symptoms subsided rapidly. The depth of periodontal pocket in patients decreased by more than 2 mm.

(4) OHIP-14 The reason for the score reduction: the score of the study group after treatment (8.8 ± 1.2) was significantly lower than that of the control group. The reason was analyzed. The symptoms of the patients were significantly relieved after medication, which showed that the bleeding and swelling pain of the gums subsided, and the patients had no pain when eating. After medication, the function of the patients recovered quickly, the loosening of the teeth of the patients was improved, the chewing ability was improved, and the drug combination therapy was implemented for the patients, which could improve their psychology, reduce the oral odor of the patients, and significantly enhance their social confidence. All these were because the patients’ inflammation was effectively controlled and the impact on oral health was reduced after the implementation of the joint scheme.

The analysis of this paper is insufficient, the sample size is small (only 64 cases), and the multicenter data is not mentioned, so there may be bias in the extrapolation of the results; In the future research, we should expand the sample size, carry out multi center research, stratified by the type of basic disease, and extend the follow-up to 6–12 months to observe the long-term efficacy and safety of patients. In addition, we can also explore the optimization of drug dosage and course of treatment, and further improve the treatment scheme.

5. Conclusion

The effect of minocycline ointment combined with chlorhexidine gargle in elderly patients with chronic periodontitis is ideal, the level of inflammatory factors after treatment is significantly lower, the periodontal clinical indicators after treatment are significantly lower, the treatment effect is significantly higher, and the score of oral health impact Scale-14

after treatment is significantly lower, which is worthy of clinical promotion and use.

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Disclosure statement

The author declares no conflict of interest.

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