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Effect and Treatment of *Lactobacillus* on Inflammation around the Implant

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Ultrasonic scaling and antibiotic therapy are traditional therapeutic method of inflammation around the implant but therapeutic effect is not ideal. In view of maintaining flora balance around the implant and implant long-term solid holdup, this experiment observes impact and clinical effect of lactobacillus metabolite on inflammation around the impact to explore a new kind of ecological drug. This drug have little or no side effect, good curative effect and low recurrence rate, which can be applied for broad groups of people[1]. 16 cases of inflammation around the impact were divided into experimental group and control group, 8 cases for each group. Lactobacillus metabolites gargle was offered to experimental group; purified water was offered to control group. Gargle way is 3 times/ day, 20 ml/time, 3 min/ time and for 7 days. Two groups of cases were clinical and microbiological tested before gargle, 3 days, 7 days and 30 days after gargle. Based on clinical and microbiological test of 8 cases of health implant, we observe subgingival flora variation trend and clinical effects of infectors with inflammation around implant. Conclusion: 1. lactobacillus metabolite can improve clinical index of inflammation around the impact including MPLI, GI, MBI and PD. 2. Lactobacillus metabolite has a strong treatment effect on inflammation around the implant and do not have side effect.

Key word: lactobacillus metabolite; inflation around the impact; effect; treatment.

In recent 30 years, artificial dental implant technology has been developing rapidly in developed countries. Artificial implant with bone fusion what is also called denture have become a kind of effective retention and support equipment of dental restoration and a regular restoration method of denture loss and defect[2]. Application prospect of oral implant is very positive but meanwhile failure of minority implant exists.

Inflammation around the implant is collectively called implant and pathological state of tissue around it. It is a kind of infectious disease that induces by bacteria. Pathogenic bacteria destroy soft tissue closed barrier and synostosis interface around implant by bacteria surface material, toxin and metabolite. Then clinical symptoms such as soft tissue inflammation around the implant increase of probing depth, bleeding, abscess, pain on probing, loose of implant and bone resorption would appear and lead to implant failure. Prevention and treatment method of inflammation around the implant is to restore physiological combination of flora around the implant by adjust balance of flora around implant. Lactobacillus is oral normal flora. It was proved that lactic acid around lactobacillus metabolites can reduce PH value of surroundings and control growing of acidophilic bacteria in gingival sulcus. This experiment observes composition, amount and clinical index change of subgingival flora before

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and after using lactobacillus metabolite gargle on patients with inflammation around the implant to evaluate curative effect of lactobacillus metabolite on inflammation around the implant. It aims to explore a new kind of ecological drug which have little or no side effect, good curative effect and low recurrence rate and can be applied for broad groups of people.

Main body

In recent years, biological materials and artificial organ are more and more widely applied in Medical area. Internal implant is a branch which develops fastest and has the largest influence. It has become one of four major breakthrough of oral scientific development in 20 century with high-speed turbine, panoramic radiograph X-ray machine and macromolecule concentration material. Medical experts at home and abroad find that gram-negative bacillus is conditioned pathogen of inflammation around the implant by analysis of patients with inflammation around the implant. Therefore, control of subgingival gram-negative bacillus of implant is critical to treatment of inflammation. Traditional treatment of inflammation around the implant is consisting of ultrasonic scaling and antibiotic therapy. However, combining with patients' condition, these two kinds of treatment are not ideal. On contrary, ultrasonic scaling will cause obvious scratch in the meanwhile of cleaning bacterial plaque and tartar. It will damage oxidation protective layer on surface of implant and then affect biocompatibility and corrosion resistance of implant, which is beneficial for secondary accumulation of bacterial plaque on rough surface of implant. Effect of antimicrobial treatment is not ideal. Human body is generally drug resistance to antibacterial agent and effect of pharmacy on patients with inflammation around is not good. Long terms of application of antibacterial drug lead to inhibition of beneficial bacterium in oral cavity and gastrointestinal tract. Pathogenic bacterium and opportunistic pathogen produce drug resistance and excessive multiply, which lead to the imbalance of flora and damage of internal environment ecological balance in human body[3].

Modern oral microbiology theory holds that inflammation around the implement is a kind of flora imbalance disease. Low immunity, chemical stimulus, mechanical injury and large dose of antibiotics will lead to position transfer and host transfer. Change of ingredients and ratio of subgingival flora transform subgingival flora from physiological combination into pathological combination[4]. According to this theory, approach of prevention and treatment of inflammation around the implant is to restore physiological combination of flora of implant by adjust balance of flora around the implant.

Diagnostic criteria of inflammation around the implant

Clinical diagnosis criteria: So far, there is divergence in formulation of diagnosis criteria of inflammation around the implant. Criteria of Mombelli are the most popular. Its main content is to do clinical examine and X ray text on patients at regular intervals two weeks after implant operation. Clinical criteria is: Pocket depth $\geq \leq 4$ mm and gingival index ≥ 1. Diagnosis criteria of X ray is: height of alveolar crest is relatively low when implant $\geq$ 3mm.

Material

Other Equipment and Reagent

Liquid paraffin, collarium, L wave bar, disposable oral cavity appliance box, alcohol lamp, human serum, palladium particles.

METHOD

Research Object

Refer to Mombelli's diagnosis criteria on inflammation around the implant, choose 8 cases of health implant, 16 cases of inflammation around the implant, 12 cases of female aged from 21~55. Total amount of selected implant is 24. All selected cases adopt cylindrical implant from patients who finish fixed denture for more than 6 month and have dentition defect and missing that do not have trauma occlusion, people who in good health situation and do not have diabetes and other systemic disease, females who are not in pregnancy and lactation period and have not taken antibiotic and immunosuppressor in three month and people who do not have treatment of periodontal and periodontal cultivation in three month. All patients are volunteers to participate in this experiment.

Therapeutic Process

16 cases of inflammation around the implant are randomly brought into experimental group and control group, 8 for each group. Lactobacillus metabolites gargle was offered to

experimental group; purified water was offered to control group. Gargle way is 3 times/ day, 20 ml/ time, 3 min/ time and for 7 days. Package of gargle is the same. Two groups of cases were respectively clinical and microbiological tested before gargle, 3 days, 7 days and 30 days after gargle. Take it as a standard, we observe clinical effect and changing trend of subgingival flora of patients who with inflammation around the implant.

Clinical Test

Clinical Index

MPLI

0 means no bacterial plaque; 1 means bacterial plaque can be found only when probe tip sweep over the surface of implant and bacteria plaque value in surface of rough implant that is sprayed by thick liquid is at least 1. 2 means invisible bacterial plaque; 3 means large amount of material Alba.

GI

0 refer to normal gingiva; 1 means gingiva have little edema and probe tip can not make it bleeding; 2 means gingiva have little edema and probe tip can make it bleeding; 3 means gingiva have a trend of spontaneous bleeding or anabrosis.

MBI

0 means no bleeding when probing along gingival margin; 1 means scattered punctate hemorrhage; 2 means linear distribution of bleeding in gingival sulcus; 3 means severe bleeding.

PD

distance from bottom of periodontal pocket to gingival margin. Adopt 0.2 N of power when measure.

Diagnostic criteria of inflammation around the implant: so far, it is controversial in formulation of diagnosis criteria of inflammation around the implant, among which criteria of Mombelli is the most popular. It main content is to make a clinical test 2 weeks after the patients put on implant denture. Its clinical criteria is periodontal PD ≥ 4M M and GI≥ 1 [9].

Evaluation of curative effect: its criteria can be classified into two grades according to criteria of Mombelli. Recovery: PD ≥ 2mm, GI ≥1; Invalid: PD ≥ 5mm, GI ≥2, serious cases have pyorrhea of pocket and fistula.

Microbiology Examination

Confirmation of Subgingival Bacterial Plaque Amount

Serum of normal people that is similar to GCF is taken as specimen. Take 0.1, 0.2, 0.3, 0.4, 0.5,…… 1.7, 1.8, 1.9, 2.0 ul of serum by finnpipette whose range is 2 ul on sterile paper point. Measure its wetted length by vemier caliper. Measure three sterile paper points on each point and use its average value to draw standard curve. Afterwards, get GCF by same sterile paper point. Find out the relative GCF on that standard curve according to the wetted length.

Collection of Specimen

Collect specimen from 8:30 am to 10:00 am. Before collection, subjects should gargle by warm water. Supragingival bacterial plaque should be stroke off. Wet lap. Insert sterile paper point into gingival sulcus in mesial buccal site of dental implant by sterile forceps and take it out 10 seconds later. Measure the wetted length of sterile paper point by vemier caliper. Put it into centrifuge tube which is contained with 0.5 ml of mercaptoethanol acid salt delivery liquid and lid with liquid paraffin to inspect as soon as possible.

Attenuation of Specimen

Shock and disperse the specimen fully and dilute it by 10 times series. Take 0.2 ml of specimen stoste and add it into 1.8 ml of Acid cysteine diluent and intensively mix up. Take 0.2 ml of mixed liquor (10-1) into another 1.8 ml of acid cysteine and dilute in turn according to the method. Dilution degree of general gingival sulcus bacteria plaque is 10-1—10-2 and aseptic technique is requested in dilution process.

Inoculation and Culture of Specimen

Take 50 ul of stoste, 10-1 and 10-2 each and inoculate in fresh prepared BHI-S, FS agar, MS agar, MSB agar and LBS agar. Smear evenly by sterile glass rod. Put it into anaerobic jar and add reducing agent palladium particles. Place it for anaerobic culture (10%CO2, 10%H2, and 80% N2) under the temperature of 37°C for 5-7 days.

Identification and count of subgingival bacteria plaque

Select black or brownish black single colony whose diameter is 1 mm in BHI-S and make microscopic examination after staining. Colony whose gram stain shows negative bacillus may be objective colony. Make a biochemical identification after enriching fungus. Colony which is negative in sugar fermentation experiment is gum porphyrin single cell bacteria. Colony which is positive in

sugar fermentation and indole experiment is prevotella intermedia. Count these two. Confirm fusobacterium nucleatum, oral streptococci strain, streptococcus mutans and lactobacillus by microscopic examination and count respectively.

Statistic analysis

Adopt SPSS 10.0 software package to make rank sum test on clinical index and subgingival flora of every implant in and between groups to detect the significant difference.

Result analysis

Treatment of DM 9811 Metabolite on Inflammation around the Implant

Comparison of Clinical Index before and After Treatment of Experiment Group

MPLI, GI, MBI and PD of implant in experiment group are all downward 3, 7, 30 days after treatment. And they are significant differentÿP<0.05 ÿcompared with before treatment. 7 days and 3 days after treatment are significant differentÿP<0.05). 7 days and 30 days after treatment are not significant different (P>0.05), as showed in table 1.

Comparison of Clinical Index after Treatment of Control Group

MPLI, GI, MBI and PD of control experiment are not significant different (P>0.05) before treatment and 3 days, 7 days, 30 days after treatment, as showed in Table 2.

Inspection Result of Clinical Index of Health Implant

As showed in Table 3, PD ≥ 2mm, GI ≥1, which is conforming to the diagnosis criteria of health and inflammation implant of Mombelli.

Comparison of Clinical Index Change before and After Treatment

MPLI of experimental and control group are not significant different (P>0.05) before treatment. 3, 7 and 30 days after treatment are significant different (P<0.05) and experimental group is lower than control group. MPLI in experimental group is not significant different with health group 7 and 30 days after treatment.

GI in experimental and control group are not significant different before treatment. It is significant different (P<0.05) 3, 7 and 30 days after treatment. And experimental group is lower than control group. GI of experimental group is not significant different with health group 7 and 30 days after treatment.

MBI of experimental and control group are not significant different (P>0.05) before

Table 1. Comparison of clinical index before and after treatment in experimental group

Clinical	Before pharmacy			3 days after pharmacy			7 days after pharmacy			30 days after pharmacy		
index	P_{25}	M	P_{75}	P_{25}	M	P_{75}	P_{25}	M	P_{75}	P_{25}	M	P_{75}
MPLI	2.00	2.50	3.00	1.00	1.50	2.00	0.25	1.00	1.750	0	1.00	1.750
GI	2.00	2.00	2.00	1.00	1.00	1.00	0	0.250	0.750	0	0.375	1.00
MBI	1.250	1.875	2.00	1.00	0.875	1.00	0	0.375	1.00	0	0.375	1.00
$PD_{(mm)}$	4.098	4.245	4.398	2.299	2.663	3.023	1.658	1.846	2.040	1.658	1.841	2.00

Table 2. Comparison of clinical index before and after treatment in control group

Clinical	Before pharmacy			3 days after pharmacy			7 days after pharmacy			30 days after pharmacy		
index	P_{25}	M	P_{75}	P_{25}	M	P_{75}	P_{25}	M	P_{75}	P_{25}	M	P_{75}
MPLI	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00
GI	1.250	1.875	2.00	1.250	1.875	2.00	1.00	1.625	2.00	1.250	1.875	2.00
MBI	1.250	2.00	2.750	1.00	1.875	2.750	1.00	1.750	2.00	1.00	1.875	2.750
$PD_{(mm)}$	4.055	4.168	4.238	4.075	4.169	4.238	4.083	4.174	4.238	4.078	4.178	4.250

Table 3. List of clinical index examination of health implant

	MPLI	GI	MBI	$PD_{(mm)}$
P_{25}	1	0	0	1.263
M	1.125	0.375	0.250	1.569
P_{75}	1.750	1	0.750	1.913

treatment. And it is significant difference (P<0.05)3, 7 and 30 days after treatment and experimental group is lower than control group. MBI of experimental group is not significant different with health group 7 and 30 days after treatment.

PD of experimental and control group is not significant different (P>0.05) before treatment. And it is significant different (P<0.05)3, 7 and 30 days after treatment. And experimental group is lower than control group. PD of experimental group is not significant different with health group 7 and 30 days after treatment.

Side Reaction

There is no side reaction in experimental and control group.

DISSUSSION

Lactobacillus DM 9811 metabolite can improve clinical index of inflammation around implant. We find that lactobacillus DM 9811 metabolite have an effective therapeutic effect on inflammation around the implant trough observation of clinical index. Clinical index such as MPLI, GI, MSB and PD are all improved when the preparation is used. Clinical symptom such as increase of PD, bleeding of probing, abscess all disappears. Its curative effect is significant and not easy to relapse. Improved effect of clinical index in experimental group is basically corresponding to that of health implant 7 days after treatment. 30 days after treatment, clinical index do not have obvious change, side reaction and relapse tendency. It may be related to adherency and distribution of bacterial plaque around the implant. Lactobacillus DM 9811 metabolite gargle is a kind of ecological preparations, which will not lead to injure and drug resistance of implant. On the one hand, acid environment is beneficial for dissolution of calcium in bacterial plaque, reducing amount of bacteria around implant and improving clinical index; on the other hand, it can inhibit gram-negative anaerobic bacteria around implant, damage formation of plaque biofilm and interrupt adherency of bacteria plaque, which can adjust balance of subgingival flora radically around the implant and maintain clinical curative effect of inflammation around the implant.

To sum up, lactobacillus metabolite gargle have an obvious effect on inflammation around the implant. It may become a new method of curing inflammation around the implant or health care product of preventing inflammation around the implant which is used in regular mouthwash before and after implant operation. As an ecological preparation, action mechanism of lactobacillus metabolite is to adjust imbalance of flora that is caused by various reasons. It does not have toxic and side effect and possess advantage in clinical application, which have a great development prospect.

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