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Research Article

Phytotherapy for *Enterococcusfaecalis*

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ABSTRACT

Oral diseases such as tooth decay, gum disease, and tooth loss can significantly affect the overall health of the individual. Tooth decay is a polymicrobial disease in which nutrition, microbial infection and host response play an important role. *Enterococcus faecalis* is one of these bacterial agents. Medicinal plants have fewer side effects compared to chemical drugs. Those have been easy to access from the past and have been used as drugs in the treatment of various diseases.

This natural source has effective ingredients which cure diseases. The efforts in this reviewing study were on reporting anti- *Enterococcusfaecalis* medicinal plants. Searching for articles in this reviewing study were done with words such as *Enterococcusfaecalis*, Medicinal plants, dental diseases and phytotherapy. Search was done from databases such as Scopus, ISC, SID, Magiran and some other databases. Accordingly, 13 medical plants which are effective on Streptococcus faecalis are used. According to the obtained results, *Chromolaenaodorata*, *Hibiscus sabdariffa*, *Newbouldalaevis*, *Psidiumguajava*, *Salvadorapersica*, *BIXA ORELLANA*, *Spondias sp.*, *Aristolochiamonticola*, *Actinidiachinensis*, *Feijoasellowiana*, *Aberiacaffra*, *Lantana camara* and *Larreatridentata* medicinal plants are the most important medicinal plants with anti-*Streptococcus faecalis* effect. Medicinal plants used in this study have anti- *Enterococcusfaecalis*effect due to existence of bioactive substances, antioxidants, flavonoids, flavones, anthocyanins, and the like.

Keywords: Oral and dental diseases, *Enterococcusfaecalis*, Medicinal plants

INTRODUCTION

Oral diseases such as tooth decay, gum disease, and tooth loss can significantly affect the overall health of the individual (1, 2).

Tooth decay is a polymicrobial disease in which nutrition, microbial infection and host response play an important role (3). Streptococci create a wide range of infections (4).

Enterococcus faecalis is a gram positive cocci and natural gut flora of humans and other mammals, which is recognized as one of the main causes of hospital infections, food poisoning and inflammation of the canal of the teeth(5).

Removal of microorganisms associated with caries from the oral environment is not only difficult but rather unreasonable, removal of microorganisms associated with caries from the oral environment is not only difficult but rather unreasonable and hence, alternative routes that are effective on the ecology of the oral environment have been investigated (5).

There are many tooth diseases. Medicinal plants have been used to treat dental diseases from ancient times (6-9). Medicinal plants have fewer side effects compared to chemical drugs (10-12).

Those have been easy to access from the past (13-15) and have been used as drugs in the treatment of various diseases (18-16).

This natural source has effective ingredients which cure diseases (20-19). The efforts in this reviewing study were on reporting anti- *Enterococcusfecalis* medicinal plants.

METHOD OF STUDY

Searching for articles in this reviewing study were done with words such as *Enterococcusfaecalis*, Medicinal plants, dental diseases and phytotherapy. Search was done from databases such as Scopus, ISC, SID, Magiran and some other databases

RESULTS

According to the obtained results, *Chromolaenaodorata*, *Hibiscus sabdariffa*, *Newbouldalaevis*, *Psidiumguajava*, *Salvadorapersica*, *BIXA ORELLANA*, *Spondias sp.*, *Aristolochiamonticola*, *Actinidiachinensis*, *Feijoasellowiana*, *Aberiacaffra*, *Lantana camara* and *Larreatridentata* medicinal plants are the most important medicinal plants with anti-*Enterococcusfaecalis* effect.

Further details in this regard have been provided in table 1.

No	Scientific Name	Part of plant	Family Name	Common Name	Origin of plant	Country Of study	year	Bacteria	Result	ref
1	Chromolaenaodorata	Leaf	Compositae	Siam weed	Nigeria	Nigeria	In vitro 1992	Clinical isolates of *Enterococcusfaecalis*	Ethanol extract of this plant with a concentration of 30mghad a diameter of 12mm inhibition zone. The MIC of this plant was also reported at 6 mg / ml. However, the diameter of the inhibition zone of ciprofloxacin (10 µg) as an antibiotic was 11 mm	(21)
2	Hibiscus sabdariffa	Calyx	Malvaceae	Roselle	Mexico	Mexico	In vitro 2006	*Enterococcusfaecalis* ATCC 10231	Antibacterial effect of methanolic extract of this plant has been proved with MIC = 0.5 mg / ml.	(22)
3	Newbouldalaevis	Leaves	Bignoniaceae		Nigeria	Nigeria	In vitro 2009	*Enterococcusfaecalis* (NCIB 775)	Antibacterial effect of methanolic extract of this plant has been proven with concentration of 20 mg / ml with diameter of 23 mm inhibition zone and MIC = 10 mg / ml. However, the diameter of the inhibition zone of streptomycin (1 mg / ml) (10 µg) as an antibiotic control was 11 mm and MIC = 0.0625.	(23)
4	Psidiumguajava	Bark	Myrtaceae	yellow guava	Nigeria	Nigeria	In vitro 2006	*Enterococcusfaecalis* (Locally isolated)	Antibacterial effect of methanolic extract of this plant has been proven with concentration of 20 mg / ml with diameter of 30 mm inhibition zone and MIC = 2.5 mg / ml. However, the diameter of the inhibition zone of streptomycin (1 mg / ml) (10 µg) as an antibiotic control was 23 mm and MIC = 0.0625.	(24)
5	Salvadorapersica	Stems	Salvadoraceae	toothbrush tree	IRAQ	IRAQ	In vitro 2008	Clinical isolates of *Enterococcusfaecalis*	Antibacterial effect of methanolic extract of this plant has been proven with concentration of 200 mg / ml with diameter of 22.3 mm inhibition zone and MIC = 0.781 mg / ml. However, the diameter of the inhibition zone of streptomycin as an antibiotic control was 24.3 mm and MIC = 0.012 mg/ml.	(25)
6	BIXA ORELLANA	Leaves	Bixaceae	Annatto	Nigeria	Canada	In vitro 1996	*Enterococcusfaecalis* (ATCC 6569)	Antibacterial effect of ethanolic extract of this plant was proven in a concentration of 5 mg /ml with a diameter of 17 mm inhibition zone and MIC = 16 mg /ml and MBC =64 mg /ml. However, the diameter of inhibition zone for antibiotic control of 25 microgram chloramphenicol was reported to be 3 mm	(26)
7	Spondias sp.	Plant material	ANACARDIACEAE	hog plums	Mexico	Mexico	In vitro 2001	*Enterococcusfaecalis*	The antibacterial properties of ethanolic extract of this plant was proven with a diameter of 10 to 13 mm inhibition zone	(27)
8	Aristolochiamonticola	Plant material	ARISTOLOCHIACEAE		Mexico	Mexico	In vitro 2001	*Enterococcusfaecalis*	The antibacterial properties of ethanolic extract of this plant was proven with a diameter of 13 to 15 mm inhibition zone	(27)
9	Actinidiachinensis	Fruits, stams and leave	Actinidiaceae		China	ITALY	In vitro 1997	*Enterococcusfaecalis* (ATCC 14428)	The antibacterial property of the estonian extract of this plant was proving by having MIC = 2 µg / ml. while, tetracyclineas an antibiotic control also had MIC = 8 µg / ml and penicillin had MIC = 2 µg / ml.	(28)
10	Feijoasellowiana	Fruits, stams and leave	Myrtaceae		South America	ITALY	In vitro 1997	*Enterococcusfaecalis* (ATCC 14428)	The antibacterial property of the seed extract of this plant was proving by having MIC = 0.5 µg / ml and pulp and covering each with MIC = 2µg / ml. while, tetracycline an antibiotic control also had MIC = 8 µg / ml and penicillin had MIC = 2 µg / ml.	(28)
11	Aberiacaffra	Fruits, stamsand leave	Flacourtiaceae	Kai apple	Southern Africa	ITALY	In vitro 1997	*Enterococcusfaecalis* (ATCC 144288)	The antibacterial property of the estonian extract of this plant was proving by having MIC = 1 µg / ml. while, tetracyclineas an antibiotic control also had MIC = 8 µg / ml and penicillin had MIC = 2 µg / ml.	(28)
12	Lantana camara	Branch	verbanaceae	wild-sage	Mexico	Mexico	Invitro 1991	*Enterococcusfaecalis*	The antibacterial properties of ethanolic extract of this plant was proven with a inhibition zone diameter more than 20 mm	(29)
13	Larreatridentata	Branch	Zygophyllaceae	greasewood	Mexico	Mexico	In vitro 1991	*Enterococcusfaecalis*	The antibacterial properties of ethanolic extract of this plant was proven with a diameter of 15 to 20 mm inhibition zone	(29)

Table 1: Medicinal Plants Effective on *Enterococcusfaecalis*

DISCUSSION

Infectious diseases represent one of the most important causes of mortality especially in the developing countries (30).Scientific studies are underway to find herbal remedies and natural antibiotics (6-9).Herbs can be effective in treating various disorders and diseases in the hospital (31-40).The drug resistance has led scientists to think of producing natural and effective drugs (6-9).Therefore, the recognition of medicinal plants that have antibacterial effects can lead to a phytochemical study of effective antibiotic herbal substances.Herbs can be a source of important drugs for infectious and noninfectious disorders and diseases (31-37).

Herbal plants can be used for the prevention, control and remedies of infectious and noninfectiousdisease. Medicinal plants used in this study have anti-*Enterococcusfaecalis*effect due to existence of bioactive substances, antioxidants, flavonoids, flavones, anthocyanins, and the like.

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