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Review Article

Microbiology Section

Phytotherapy in *Streptococcus agalactiae:* An Overview of the Medicinal Plants Effective against *Streptococcus agalactiae*

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ABSTRACT

Streptococcus agalactiae is a spherical and Gram-positive bacterium that causes postpartum sepsis, endometritis, chorioamnionitis and premature delivery in pregnant women. The use of herbs and natural ingredients for the treatment of various disorders has been common. The present review is a report on the medicinal plants with anti-Streptococcus agalactiae effects. In this review, the search was carried out in Web of Science, PubMed, Scopus, Google Scholar and Science direct by keywords such as bacteria, *Streptococcus agalactiae* and medicinal plants. According to the search results, 10 medicinal plants are used as anti-bacterial against Streptococcus agalactiae. Results of this study suggest that the active ingredients listed in this review paper used for pharmacological studies on *Streptococcus agalactiae* so it can produce effective natural antibiotic for the future.

Keywords: Bacteria, Herbs, Infection, Pharmacology

INTRODUCTION

Streptococcus Group B (SGiB) bacteria such as *Streptococcus agalactiae* are the normal flora of the gastrointestinal tract, urogenital tract and the genitourinary tract which have been isolated from about 35% of healthy adult women [1]. *Streptococcus agalactiae* is a gram- positive and spherical bacterium. The bacterium is also the cause of meningitis, infection of the newborn, pneumonia and sepsis [2]. The bacterium is colonized in the rectum and the vagina of pregnant women and about 2% of newborns are infected with *Streptococcus agalactiae*.

Based on the obtained results and CDC guidelines on screening the pregnant women and risk factors, prevalence of *Streptococcus agalactiae* infections in infants has decreased [3-5]. *Streptococcus agalactiae* causes infections of birth sepsis, endometritis, chorioamnionitis and premature delivery in pregnant women [1,6].

For centuries, the use of herbs and natural ingredients has been common for the treatment of various disorders [7-9]. Despite the demonstrated antimicrobial effects of some herbal ingredients (extracts, essences and alkaloids), their uses in the treatment of infections are not common. The present review is a report on the medicinal plants with anti-*Streptococcus agalactiae* effects. This study is an overview of the most important medicinal plants affecting *Streptococcus agalactiae*.

For this review, search was carried out by using the keyword such as bacteria, *Streptococcus agalactiae* and medicinal plants. The databases used were Web of Science, PubMed, Scopus, Google Scholar and Science direct.

According to the search results, 10 medicinal plants are used as antibacterials against *Streptococcus agalactiae*. [Table/Fig-1] [10,11].

DISCUSSION

S. agalactiae is an asymptomatic colonizer of the gastrointestinal human tract, however, in some circumstances, it causes severe infections. As with other virulent bacteria, *S. agalactiae* harbors important virulence factors [12,13]. Though, vaccination is associated with reduction in disease incidence and prevalence, however there is no effective and safe approach for treatment of the disease. Therefore, medicinal plants might be beneficial and safe for eradication of the bacteria.

S. agalactiae, other than human infections, can cause mastitis in dairy cattle leading to a economic loss for the industry. *S. agalactiae* can also produce acute or subacute febrile diseases in cow, diminishing production of milk. Thus, an outbreak affects the dairy industry. Hence, in many countries approaches to reduce the impact of *S. agalactiae* have been enforced in recent decades [14,15]. *S. agalactiae* has also been reported in some other animals including cats, crocodiles, camels, dogs, seals and dolphins [16].

Antibiotic destroys pathogenic bacteria or other microorganisms and help the body to better cope with diseases. Natural antibiotics are drugs that are extracted from medicinal plants. Natural antibiotics cover a wide range. Clinical research shows that oregano oil, garlic, etc., are the most effective natural antibiotics that can destroy even the most resistant bacteria in the body. Recent studies have also shown the beneficial effects of these natural remedies [17,18]. The positive effects of these plants has encouraged more people to show a positive attitude for herbal medicines [19,20].

CONCLUSION

Natural ingredients reduce the risk of complications and have beneficial effects. These natural ingredients increase the beneficial bacteria and strengthen the immune system. Given that, antibacterial effects of medicinal plants mentioned in this review has been proven, it is recommended that the main active ingredients of medicinal plants be identified and studied further to approve their antimicrobial effects and in preparation of new drugs.

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Family Name	Scientific name	Parts of plant	Microrganism	Results	Reference
Papaveraceae	*Papaver macrostomum*	Aerial parts	*Streptococcus agalactiae* (RITCC1913)	Anti-bacterial effect of flower ethanol extract of the plant through the inhibition zone diameter of 40 mm and MIC=1.5 was confirmed. However, the inhibition zone diameter of gentamycin was 20 mm as the control.	[10]
Papaveraceae	*Papaver dubium*	Aerial parts	*Streptococcus agalactiae* (RITCC1913)	Anti-bacterial effect of aerial parts ethanol extract of the plant through the inhibition zone diameter of 40 mm and MIC=3.125 was confirmed. However, the inhibition zone diameter of gentamycin was 20 mm as the control.	[10]
Papaveraceae	*Papaver argemone*	Aerial parts	*Streptococcus agalactiae* (RITCC1913)	Anti-bacterial effect of flower ethanol extract of the plant through the inhibition zone diameter of 40 mm and MIC=0.75 was confirmed. However, the inhibition zone diameter of gentamycin was 20 mm as the control.	[10]
Papaveraceae	*Papaver bracteatum*	Aerial parts	*Streptococcus agalactiae* (RITCC1913)	Anti-bacterial effect of flower ethanol extract of the plant through the inhibition zone diameter of 25 mm and MIC=6.25 was confirmed. However, the inhibition zone diameter of gentamycin was 20 mm as the control.	[10]
Papaveraceae	*Papaver armeniacus microstigma*	Aerial parts	*Streptococcus agalactiae* (RITCC1913)	Anti-bacterial effect of flower ethanol extract of the plant through the inhibition zone diameter of 20 mm and MIC=6.25 was confirmed. However, the inhibition zone diameter of gentamycin was 20 mm as the control.	[10]
Papaveraceae	*Papaver chelidonium folium*	Aerial parts	*Streptococcus agalactiae* (RITCC1913)	Anti-bacterial effect of flower ethanol extract of the plant through the inhibition zone diameter of 20 mm and MIC=6.25 was confirmed. However, the inhibition zone diameter of gentamycin was 20 mm as the control.	[10]
Basellaceae	*Anredera diffusa*	leaf	*Streptococcus agalactiae* (Group B, ATCC 13813)	The ethanol extract of the plant with more than 0.7 cm diameter of inhibition zone had antibacterial properties. However, the inhibition zone diameter of more than 0.7 cm was reported for vancomycin as a positive control.	[10]
Solanaceae	*Cestrum auriculatum*	leaf	*Streptococcus agalactiae* (Group B, ATCC 13813)	The ethanol extract of the plant with more than 0.7 cm diameter of inhibition zone had antibacterial properties. However, the inhibition zone diameter of more than 0.7 cm was reported for vancomycin as a positive control.	[11]
Krameriaceae	*Krameria triandra*	Root/ stem	*Streptococcus agalactiae* (Group B, ATCC 13813)	The ethanol extract of the plant with more than 0.7 cm diameter of inhibition zone had antibacterial properties. However, the inhibition zone diameter of more than 0.7 cm was reported for vancomycin as a positive control.	[11]
Caprifoliaceae	*Sambucus peruviana*	Leaf/shoot	*Streptococcus agalactiae* (Group B, ATCC 13813)	The ethanol extract of the plant with more than 0.7 cm diameter of inhibition zone had antibacterial properties. However, the inhibition zone diameter of more than 0.7 cm was reported for vancomycin as a positive control.	[11]

[Table/Fig-1]: List of medicinal plants effective on *Streptococcus agalactiae*.

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