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REVIEW PAPER

Streptococcus Pneumonia Phytotherapy

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Abstract: Streptococcus pneumoniae belongs to gram-positive coccus family of Streptococcaceae from Streptococcus viridans group. Streptococcus pneumoniae is a bacterium that causes infections such as sinusitis, ear infection and earache, septicemia, pneumonia, and meningitis. Plants are rich sources of bioactive compounds, hence are effective in a wide variety of diseases. Paying special attention toward more medicinal herbs is due to the promising effects of plants in prevention and/or treatment of diseases. The present review is in fact a report of the most effective medicinal plants on Streptococcus pneumonia. In this research, search was carried out by using the key words such as bacteria, Streptococcus pneumoniae and medicinal plants. Databases of Web of Science, PubMed, Scopus, Google Scholar, and Science direct were used to search, and related articles were used to review. Based on the results of the review on the texts, 13 medicinal herbs are the most important herbs with antibacterial properties against Streptococcus pneumonia.

Keywords: *Streptococcus pneumoniae, Herb, Antibacterial.*

Introduction

Streptococcus pneumoniae belongs to gram-positive coccus family of Streptococcaceae from viridans group Streptococcus [1]. Streptococcus pneumoniae or pneumococcus includes 92 serotypes all of which are pathogenic, but ten serotypes are more important for the creation and development of human infections [2]. Capsules, Pneumolysin O, neuraminidase, autolysins, cell wall components, lipase hyaluronate, and surface proteins are other pathogens found in pneumococcus [3]. Streptococcus pneumoniae is a bacterium that causes infections such as sinusitis, ear infection and earache, septicemia, pneumonia and meningitis [4].

Annually, more than a million children under five years in the developing world lose their lives due to the infection caused by the bacteria [5]. The incidence of antibiotic resistance particularly to penicillin and erythromycin has been strongly increased and treatment of infections caused by these bacteria has become difficult [6].

Streptococcus pneumoniae strains were previously susceptible to penicillin uniformly and obviously, however, in 1967, approximately all strains were sensitive to the density of less than 0.05 micrograms per milliliter and now the advent of penicillin-resistant pneumococci is increasing [7].

Undoubtedly, the twentieth century is the century of prosperity and development of life and medical sciences and the scientific and research achievements are more than the range that has been achieved in all human

history. Although the maturity of life sciences, including microbiology, immunology, physiology, and genetics and the discovery of antibiotics, antibodies, vaccine production, the synthesis of various synthetic drugs, and finally, gene therapy and the use of nanotechnology in medicine explain the rapid advances and unsurpassed knowledge in this century, however, they could not yet resolve the problems in disease treatment. Plants are considered as a huge source of bioactive compounds and without considering the challenges in the field of medicinal plants, collective opinion of researchers and scientists emphasizes on their importance in the preparation of drugs. In this regard, lots of researches have been done on herbal medicine and have confirmed their positive effects, not only in infections but also in other diseases [8-11]. There is a special attention to the medicinal plants that is largely because of the promising effects of plants in the prevention or treatment of diseases. This review was designed to report the most effective medicinal plants on Streptococcus pneumonia

Methods

In this study, search was carried out by keywords bacteria, Streptococcus pneumonia and medicinal plants. Databases including Web of of Science, PubMed, Scopus, Google Scholar, and Science direct were used to search and the related articles were used to review.

Results

Table 1: List of medicinal plants affecting Streptococcus pneumonia

Scientific Name	Result	Ref.
Allium sativum	Inhibition zone diameter of aqueous extract of this plant was 23 mm and diameter inhibition zone of ethanol extract of the plant was21 mm. MIC of aqueous extract of this plant was 75 mg/ml and the MIC of ethanol extract was 100 mg/ml. MBC was respectively 100 mg/ml and 125 mg/ml. However, the inhibition zone diameter of metronidazole as an antibiotic was reported30 mm. MIC and MBC of this antibiotic was also 12.5 and 25, respectively.	12
Crescentiaalata	Anti-bacterial properties of extract of this herb were MIC=1.2. At the same time the MIC of gentamicin was 0.005 as the control.	13
Bougainvillea glabra	Anti-bacterial properties of extract of this herb were MIC=2.5. At the same time the MIC of gentamicin was 0.005 as the control.	13
Cunilalythrifolia	Anti-bacterial properties of extract of this herb were MIC=2.5. At the same time the MIC of gentamicin was 0.005 as the control.	13
Gnaphaliumamericanum	Anti-bacterial properties of extract of this herb were MIC=1.2. At the same time the MIC of gentamicin was 0.005 as the control.	13
Gnaphaliumoxyphyllum	Anti-bacterial properties of extract of this herb were MIC=1.2. At the same time the MIC of gentamicin was 0.005 as the control.	13
Gossypiumhirsutum	Anti-bacterial properties of extract of this herb were MIC=1.2. At the same time the MIC of gentamicin was 0.005 as the control.	13
Marrubium Vulgare	Antibacterial activity of methanol extract of this plant having 21 to 23 mm inhibition zone diameter and MIC = 256µg / ml was confirmed. This is despite the fact that the inhibition zone diameter of chloramphenicol as control was 17 to 25 mm.	14
Thymus pallidus	Antibacterial activity of methanol extract of this plant having 22 to 24 mm inhibition zone diameter and MIC = 256µg / ml was confirmed. However, the inhibition diameters of chloramphenicol as a control was 17 to 25 mm.	14
Lavandulastoechas	Antibacterial activity of methanol extract of this plant having 24 to 25 mm inhibition zone diameter and MIC=256µg / ml was confirmed. However, the inhibition zone diameters of chloramphenicol as a control was 17 to 25 mm.	14
Adiantum capillus–veneris	Antibacterial activity of methanol extract of this plant with a MIC=7.81 was confirmed. At the same time the MIC of gentamicin as the control was 3.9.	15
Adiantumperuvianum	Antibacterial activity of methanol extract of this plant has proved MIC = 3.9. At the same time the MIC gentamicin as the control was 3.9.	15
Glycyrrizaglabra	Antibacterial activity of methanol extract of this plant with an inhibition zone diameter of 10 mm was established. However, the inhibition zone diameter of chloramphenicol was 10 mm as control.	16
Cocciniagrandis	Antibacterial activity of methanol extract of this plant with an inhibition zone diameter of 9 mm was established. However, the inhibition zone diameter of chloramphenicol was 10 mm as control.	16
Dathura metal	Antibacterial activity of methanol extract of this plant with an inhibition zone diameter of 9 mm was established. However, the inhibition zone diameter of chloramphenicol was 10 mm as control.	16
zingiberofficinale	The anti-bacterial of ethanol extract of this plant with inhibition zone diameter of 4 mm and MIC=0.001µg/ml and MBC=0.15µg / ml was confirmed. However, the inhibition zone diameter of tetracycline, penicillin, erythromycin, tetracycline, chloramphenicol, and clindamycin as antibiotics was less than the extract.	17

garcinia kola	The ethanol extract of this plant with anti-bacterial inhibition zone diameter of 9 mm and MIC=0.00008 µg/ml and MBC=0.135 µg/ml was confirmed. However, the inhibition zone diameter of tetracycline, penicillin, erythromycin, tetracycline, chloramphenicol and clindamycin as antibiotic was less than the extract.	17
Mammeaafricana	Anti-bacterial activation of ingredient of this plant, with the MIC=0.5 µg/ml was confirmed. This is despite the fact that ciprofloxacin as control has MIC=0.25 µg/ml.	18
Anrederadiffusa	The ethanol extract of the plant more than 0.7 cm in diameter inhibition zone had antibacterial properties. However, the inhibition zone diameter of more than 0.7 cm vancomycin was reported as a positive control.	19
Cassia tomentosa	The ethanol extract of the plant more than 0.7 cm in diameter inhibition zone had antibacterial properties. However, the inhibition zone diameter of more than 0.7 cm vancomycin was reported as a positive control.	19
Cestrum auriculatum	The ethanol extract of the plant more than 0.7 cm in diameter inhibition zone had antibacterial properties. However, the inhibition zone diameter of more than 0.7 cm vancomycin was reported as a positive control.	19
Krameriatriandra	The ethanol extract of the plant more than 0.7 cm in diameter inhibition zone had antibacterial properties. However, the inhibition zone diameter of more than 0.7 cm vancomycin was reported as a positive control.	19
Sambucusperuviana	The ethanol extract of the plant more than 0.7 cm in diameter inhibition zone had antibacterial properties. However, the inhibition zone diameter of more than 0.7 cm vancomycin was reported as a positive control.	19

Discussion

A lot of studies have revealed that herbal medicines are good source of molecules with antioxidant activity and antimicrob property which are able to protect the body against cellular oxidation and pathogens. Hence characterization of various herbal medicinsl for their antioxidant and antimicrobial potential is important [20-21]. Herbal compounds that are safe and combat pathogens are good candidates for preparation of new antimicrobial medicines. Lots of them have been used for a long times and by many cultures. Many studies have revealed the properties of herbs on pathogenic microorganisms [22]. Identification of secondary metabolites of plants is one of the goals of psychopharmacology. Plants active components play important roles in plant adaptation to environmental conditions and in having high medicinal values. Phenolic compounds involved in a group of aromatic secondary plant compounds have many biological activities such as antimicrobial and antioxidant effects [23-25]. Many medicinal plants in this study have the active phenolic ingredients and apply their anti- Streptococcus pneumonia effect due to their materials.

The phenolic compounds present in medicinal plants mostly have antioxidant activity. There are also other compounds which are effective in a variety of conditions [26,27]. Pneumonia is an infectious disease of the lower respiratory tract which results in inflammation. The plants which contain phenolic compounds, especially flavonoid compounds, usually have anti-inflammatory activity. Most of the plants presented in this article possess antioxidant activity [28]. Therfore, they may lelp treating Pneumonia by this property, Too. The pneumonia symptoms include cough, chest pain, fatigue, labored breathing, fever, chills, bloody sputum, headache, anorexia and leukocytosis. Most of these symptoms are associate with increased oxidative stress. Flavonoids, have antioxidant

These medicinal plants might be used for preparation of new drugs, however, their toxicology evaluations are needed for more secure usage of these plants.

References

1. Arbique JC, Poyart C, Trieu-Cuot P, Quesne G, Carvalho Mda G, Steigerwalt AG,(2004) et al. Accuracy of Phenotypic and Genotypic Testing for Identification of Streptococcus pneumoniae and Description of Streptococcus pseudopneumoniae sp. nov. J Clin Microbiol 42: 4686-4696.

2. Jedrzejas MJ(2007) Unveiling molecular mechanisms of bacterial surface proteins: *Streptococcus pneumoniae* as a model organism for structural studies. Cell Mol Life Sci. 64(7): 799-822.

3. Mitchell AM, Mitchell TJ (2010) *Streptococcus pneumoniae*: virulence factors and variation. Clin Microbiol Infect. 16(5):411-8.

4. Obaro S, Adegbola R (2002) The Pneumonococcus: carriage, disease, and conjugate vaccines. J Med Microbiol51: 98-104.

5. Cartwright K (2002) Pneumococcal disease in western Europe: burden of disease, antibiotic resistance and management. Eur J Pediatr. 161(4): 188-95.

6. Song JH, Jung SI, Kwan SK, Kim NY, Son JS, Chang HC, (2004) et al. High prevalence of antimicrobial resistance among clinical streptococcus pneumoniae Isolates in Asia (an ANSORP Study). Antimicrob Agents Chemother 48: 2101-2107.

7. Lyon DJ, Scheel O, Fung KSC, Cheng AFB, Henrichsen J (1996) Rapid emergence of penicillinresistant pneumococci in Hong Kong. Scandinavian journal of infectious diseases. 28(4):375-376.

8. Hosseinzadeh B, Khoshtaghaza M, Loriooini.Z , Minaei S, Zareiforoush H(2015) Analysis of the combinative effect of ultrasound and microwave power on *Saccharomyces cerevisiae* in orange juice processing. Innovative Food Science and Emerging Technologies 32: 110-115.

9. Bahmani M, Sarrafchi A, Shirzad H, Rafieian-Kopaei M (2016) Autism: Pathophysiology and promising herbal remedies. Curr Pharm Des. 22(3):277–285.

10. Fasihzadeh, S, Lorigooini, Z, Jivad, N (2016) Chemical constituents of *Allium stipitatum* regel (persian shallot) essential oil. Der Pharmacia Lettre. 8 (1):175-180.

11. Hosseinzadeh B, Zareiforoush H, lorigooini. Z , Ghobadian B, Rostami S, Fayyazi E (2014) Ultrasonic-assisted production of biodiesel from *Pistacia atlantica* Desf. Oil. Fuel. 2016;168:22-26.Bahmani M, Rafieian-Kopaei M, Hassanzadazar H, Saki K, Karamati SA, Delfan B. A review on most important herbal and synthetic antihelmintic drugs. Asian Pac J Trop Med; 7(1): 29-33.

12. Abubakar E-m M (2009) Efficacy of crude extracts of garlic (Allium sativum Linn.) against nosocomial Escherichia coli, Staphylococcus aureus, Streptococcus pneumoniea and Pseudomonas aeruginosa. Journal of Medicinal Plants Research. 3(4):179-85.

13. Rojas G, Lévaro J, Tortoriello J, Navarro V (2001) Antimicrobial evaluation of certain plants used in Mexican traditional medicine for the treatment of respiratory diseases. Journal of Ethnopharmacology. 74(1):97-101.

14. Warda K, Markouk M, Bekkouche K, Abbad MLA, Romane A, Bouskraoui M (2009) Antibacterial evaluation of selected Moroccan medicinal plants against Streptococcus pneumoniae. African Journal of Pharmacy and Pharmacology. 3(3):101-4.

15. Singh M, Singh N, Khare P, Rawat (2008)A Antimicrobial activity of some important Adiantum species used traditionally in indigenous systems of medicine. Journal of ethnopharmacology.115(2):327-9.

16. Bagyalakshmi B, Sridhar D, Ponmurugan P (2002) Antimicrobial activity of important Indian medicinal plants against Pyogenic infection. Journal of phytology. 2009;1(6).Akoachere JT, Ndip R, Chenwi E, Ndip L, Njock T, Anong D. Antibacterial effects of Zingiber Officinale and Garcinia Kola on respiratory tract pathogens. East African medical journal. 79(11):588-92.

17. Akoachere JT, Ndip R, Chenwi E, Ndip L, Njock T, Anong D. Antibacterial effects of Zingiber Officinale and Garcinia Kola on respiratory tract pathogens. East African medical journal. 79(11):588-92.

18. Canning C, Sun S, Ji X, Gupta S, Zhou K (2013) Antibacterial and cytotoxic activity of isoprenylated coumarin mammea A/AA isolated from Mammea africana. Journal of ethnopharmacology. 147(1):259-62.

19. Neto CC, Owens CW, Langfield RD, Comeau AB, Onge JS, Vaisberg AJ,(2002) et al. Antibacterial activity of some Peruvian medicinal plants from the Callejon de Huaylas. Journal of ethnopharmacology. 79(1):133-8.

20. Bajpai M, Pande A, Tewari SK and Prakash D (2005). Phenolic contents and antioxidant activity of some food and medicinal plants. International Journal of Food Sciences and Nutrition, 56(4): 287-291.

21. Wojdylo A, Oszmianski J and Czemerys R (2007) Antioxidant activity and phenolic

compounds in 32 selected herbs. Food Chemistry, 105: 940-949.

22. Yano Y, Satomi M and Oikawa H (2006): Antimicrobial effect of spices and herbs on Vibrio parahaemolyticus. Int. J. of Food Microbiol., 111: 6-11.

23. Karamati SA, Hassanzadazar H, Bahmani M, Rafieian-Kopaei M (2014) Herbal and chemical drugs effective on malaria. Asian Pac J Trop Dis 4(2): 599-601.

24. Rabiei Z, Bigdeli M, Lorigooini ZA (2015) review of medicinal herbs with antioxidant properties in the treatment of cerebral ischemia and reperfusion. Journal of Babol University of Medical Sciences. 17(12): 45-76.

25. Sarrafchi A, Bahmani M, Shirzad H, Rafieian-Kopaei M (2016) Oxidative stress and Parkinson's disease: New hopes in treatment with herbal antioxidants. Curr Pharm Des. 22(2): 238 –246.

26. Shahrani M., Rafieian M, Shirzad H, Hashemzadeh M, Yousefi H, Khadivi R, Amini SA, Dehghan M, Khayri S, Moradi M., Rahimian G, Gheitasi (2007) I. Effect of Allium sativum L. extract on acid and pepsin secretion in basal condition and stimulated with Vag Stimulate in Rat. J Med Plants. 6(24): 28-37.

27. Lorigooini Z, Kobarfard F, Ayatollahi SA (2014) Anti-platelet aggregation assay and chemical composition of essential oil from *Allium atroviolaceum* Boiss growing in Iran. International Journal of Biosciences (IJB). 5(2):151-6.

28. Shayganni E, Bahmani M, Asgary S, Rafieian-Kopaei M (2015) Inflammaging and cardiovascular disease: Management by medicinal plants, Phytomedicine.http://dx.doi.org/10.1016/j.phymed.2015.11.004.

