

**RESEARCH ARTICLE** 

**OPEN ACCESS** 

# Antibacterial activity of different extracts of *Abrus precatorius* leaves against oral microflora to improve oral hygiene

#### Diwan PD

Assistant Professor, Department of Zoology, J.D. Patil Sangludkar Mahavidyalaya, Daryapur dist. Amravati, (M.S.) Email- <u>diwanprity5@gmail.com</u>

#### Manuscript Details

Received :22.07.2023 Accepted: 22.08.2023 Published: 24.08.2023

Available online on <u>https://www.irjse.in</u> ISSN: 2322-0015

#### Cite this article as:

Diwan PD. Antibacterial activity of different extracts of *Abrus precatorius* leaves against oral microflora to improve oral hygiene, *Int. Res. Journal of Science & Engineering*, 2023, Volume 11(4): 187-190.

https://doi.org/10.5281/zenodo.8350168

Open Access This article is licensed CC under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit http://creativecommons.org/licenses/by/4.0/

#### Abstract

Medicinal plants are part and parcel of human society to compact diseases from dawn of civilization. Herbs are considered to be food rather than medicine because they are complete, all natural and pure, as nature intended. Oral diseases are major health problem with dental caries. Oral health influence the general quality of life and poor oral health is linked to chronic conditions and systemic diseases. Effective antimicrobial agents against these oral pathogens could play an important part in the prevention of dental caries. Natural products have been used for thousands of years in folk medicine for several purposes including oral health care. Present investigation is focused on antibacterial activity of aqueous, petroleum ether, chloroform and acetone extract of leaves of Abrus precatorius (Family- Fabaceae) against seven bacterial species (Lactobacillus rhamnosus, Staphylococcus aureus, Bacillus subtilis, Actinomyces viscoscus, Staphylococcus epidermidis, Escherichia coli, Streptococcus mutans) which are known to cause oral diseases in human being. Antibacterial activity of the extracts was determined by paper disc diffusion method using 200mg/ml concentration of extract and there % zone of diffusion was calculated. Result showed that all the four extracts are equally effective at 5% level of significance. Test organism from the present study were found to be effected by all the four type of extract of Abrus precatorius leaves but pronounced inhibition for four extract was observed for bacterial species, Lactobacillus rhamnosus,. Aqueous extract was found to be more effective against the entire test microorganism.

**Keywords:** Oral micro-organisms, Antibacterial activity, *Abrus precatorius*, Oral diseases, Medicinal plants.

# 1. Introduction

Right from its beginning, the documentation of traditional knowledge, especially medicinal uses of plants, has provided many important drugs of modern day [1]. Investigation of traditional medicine is very important for the welfare of rural and tribal communities for treatment of conventional illness. This is due to the health care facilities in rural areas are inadequate and expensive too. Moreover, traditional medicine based on plants provides utmost rural or tribal healthcare, because 80% of the

raw materials used in the preparation of drugs is obtained from medicinal plants. A vast knowledge and venerable history of use of plants against different health problems has been known since antiquity. Alike different health illness, dental and oral diseases has becoming an alarming problems of the century. Poor hygiene, poor nutrition and smoking contribute to dental and oral problems. Due to colonization and accumulation of microorganism, oral diseases are included into a category of global infectious diseases. As most of the oral diseases are due to bacterial infections and it has been well documented that medicinal plants confer considerable antibacterial activity against various microorganisms including bacteria responsible for dental caries [2].

A few recent studies have documented antimicrobial activity against selected oral pathogen from natural resources. An antibacterial activity of *Myristica fragrans* against Oral Pathogens [3]. Similarly antibacterial activity of *Glycyrrhiza glabra* against oral pathogens was carried out and found effective results against oral pathogens [4]. An *in vitro study* evaluated antibacterial activity of different extract of *J. regia* against oral micro flora [5]. In vitro antibacterial activity of traditional medicinal plants from tribal regions against oral pathogen has also shown positive results [6].

Survey study of traditional ethnomedicinal plants used for oral health care by tribals of Melghat region. Dist. Amravati (M.S.) India has been carried out and found that *Abrus prcatorius* species is most predominantly used for oral care by tribal population [7]. In the present investigation antibacterial activity of *Abrus precatorius* (Family- Fabaceae) aqueous, pet ether, chloroform and acetone extract of leaves of was carried out against seven bacterial species which are known to cause oral diseases in human being. Abrus prcatorius commonly bean or rosary as jequirity pea is an known herbaceous flowering plant in the bean family Fabaceae. It is a slender, perennial climber with long, pinnateleafleted leaves that twines around trees, shrubs, and hedges. The plant is best known for its seeds, which are used as beads and in percussion instruments. It is commonly called as Gunj in Marathi. Tribals of Melghat region use this plant species for medicinal purpose as well as food stuff.

# 2. Material and Method

#### 2.1 Plant collection and identification

Fresh leaves of *Abrus precatorius* was collected from Amravati and Melghat region. Authentication and identification was performed at department of botany Govt. Vidarbha Institute of Science and Humanities, Amravati. Collected material was shade dried and stored into airtight container.

#### 2.2 Preparation of extracts

Shade dried powdered extract of leaves was subjected to successive Sox let extraction using solvent of varying polarity such as water, petroleum ether, chloroform and acetone. After extraction solvent was removed under reduced pressure. Extracted material was stored in airtight container till use.

#### 2.3 Test organism / Microbial flora

Seven lyophilized bacterial strains were procured from Institute of Microbial Technology (IMTECH), Microbial Type Culture Collection (MTCC) Chandigarh.

### **Table 1-List of Bacterial Strains**

S.N.	Bacterial Strain	Gram +/-	MTCC	Growth Medium (Agar and Broth)	Incubation	Incubation
		ve	Code		time in hours	Temp.
1	Lactobacillus rhamnosus	+ ve	*1408	MRS agar and broth	24-48	37 <sup>°</sup>
2	Streptococcus mutans	+ ve	890	Brain Heart Infusion(BHI) agar and broth	48	37 <sup>°</sup>
3	Staphylococcus aureus	+ ve	3408	Soyabene Casein Digest agar and broth	24	37 <sup>°</sup>
4	Actinomyces viscoscus	+ ve	7345	Pikoskaya's agar	24	30 <sup>°</sup>
5	Staphylococcus epidermidis	+ ve	3639	Nutrient agar and broth	24	30 <sup>°</sup>
6	Escherichia coli	- ve	732	Nutrient agar and broth	24	37 <sup>°</sup>
7	Bacillus subtilis	+ ve	3160	Nutrient agar and broth	24	30 <sup>°</sup>

#### 2.4 Antibacterial activity by disc diffusion assay

Antibacterial activity of 4 extracts i.e. aqueous, petroleum ether, chloroform and acetone were determine by paper disc diffusion method of Bauer[8,9] Sterilized Whatman filter paper no. 1 discs of 5 mm diameter were soaked in respective 200 mg/ml extract solution.0.2 ml inoculums of test organism was spread on surface of respective bacterial agar plates. Previously soaked discs were placed on surface of inoculated plates. Ciprofloxacin is used as positive control and water, DMSO was used as negative control. Bacterial plates were initially transferred to refrigerator for 40-45 min to allow diffusion and then transferred to incubator set at 37<sup>o</sup> c. and incubated for given incubation period. All the tests were performed in triplicates and under the sterile condition. Zone of inhibition in mm were measured from edge of disc after incubation.

#### 2.5 Analysis of data

#### 2.5.1 % Zone of inhibition

% Zone of inhibition of 4 extracts of plant *Abrus precatorius* leaves against seven bacterial strains were calculated by formula-

```
% Zone of thibition in mm = \frac{\text{Zone of inhibition of experimental plant extract in mm}}{\text{Zone of inhibition of positive control (standard drug) in mm}} X100
```

189

## 3. Result and Discussion

The results for zone of inhibition against test organisms (oral bacteria) were observed for all the four extracts of leaves of Abrus precatorius aqueous, pet. ether, chloroform and acetone extract). Percent zone of inhibition was calculated by comparing zone of inhibition of plant extract with the zone of inhibition of standard drug used. (Ciprofloxacin). Table 2 depicts the result of Zone of inhibition of 4 extract of Abrus precatorius leaves against test microorganisms. From the results, it is observed that aqueous extract showed maximum inhibitory action against the test microorganism i.e. 36.3% for Lactobacillus rhamnosus, 20% for against Staphylococcus epidermidis, 13.18 % for against Streptococcus mutans, 13.15% for Escherichia coli and 25.5% for Staphylococcus aureus. Although all test organism from the present study were found to be affected by the four types of extract of Abrus precatorius leaves but pronounced inhibition of all the extract was observed for bacterial species Lactobacillus rhamnosus. Minimum inhibitory action of all extracts was found against Staphylococcus aureus and no antibacterial effect was found against Bacillus subtilis and Actinomyces viscoscus.

 Table 2- Zone of inhibition of 4 extract of Abrusprcatoriusleaves against test microorganisms

Plant and control	L.r	S.m	S.e	E.c	S.a
Aqueous extract zone of inhibition in mm					
Abrus precatorius	7	2.5	4	5	5
Standard drug (Ciprofloxacin )	19.3	18	20	15.2	19.6
% zone of inhibition	36.3%	13.8%	20%	13.15%	25.5%
Petroleum extract zone of inhibition in mm					
Abrus precatorius	5	1.1	2.1	1	0.5
Standard drug (Ciprofloxacin )	25	13	12	20	12
% zone of inhibition	20%	8.46%	17.5%	5%	4.1%
Chloroform extract zone of inhibition in mm					
Abrus precatorius	2.1	1	2	1	0.5
Standard drug (Ciprofloxacin )	25	18	25	25	36
% zone of inhibition	8%	5.5%	8%	4%	1.3%
Acetone extract zone of inhibition in mm					
Abrus precatorius	3	1	2	0.7	0.3
Standard drug (Ciprofloxacin )	11	7	23	28	26
% zone of inhibition	27.2%	14.2%	8.6%	2.5%	1.1%

L.r- Lactobacillus rhamnosus, S.m-Streptococcus mutans, S.e- Staphylococcus epidermidis, E.c- Escherichia coli,

S.a- Staphylococcus aureus.

Despite the widespread use of toothbrushes and toothpastes, natural methods of tooth cleaning using chewing sticks selected and prepared from the twigs, stems or roots from a variety of plant species have been practiced for thousands of years in Asia, Africa, the Middle East and the Americas [10]. Natural products have been used for thousands of years in folk medicine for several purposes. As most of the oral diseases are due to bacterial infections and it has been well documented that medicinal plants confer considerable antibacterial activity against various microorganisms including bacteria responsible for dental caries [2]. An Assessment of phytochemical composition and antibacterial activity of different extracts of Merremiaem argenata leaves and Barleria prionitis against oral microflora to improve dental hygiene has been evaluated and they got a resistant activity [11,12].

In the present investigation four extract of *Abrus precatorius* has been screened for its antibacterial potential against seven strains of oral bacteria i.e *Lacto bacillus rhamnosus Streptococcus mutans, Staphylococcus aureus, Actinomyces viscoscus, Bacillus subtilis, Escherichia coli* and *Staphylococcus epidermidis* by disc diffusion method. Although test organism from the present study were found to be effected by all the four type of extract of *Abrus precatorius* leaves but pronounced inhibition for four extract was observed for bacterial species, *Lactobacillus rhamnosus,*. Aqueous extract was found to be more effective against the entire test microorganism.

# 4. Conclusion

This study has confirmed antimicrobial potential of the plant *Abrus precatorius*, thus supporting its folklore application as preventive remedy against oral microbial diseases. The present investigation is an attempt to give herbal products against the drugs used today.

**Conflicts of interest:** The author stated that no conflicts of interest.

# References

- 1. Pushpagandan P and Kumar B. Ethnobotany, CBD, WTO and the Biodiversity Act of India. *J Ethnobotany*. 2005; 17: 2-12.
- Jonathan EK, Anna KJ, Johannes and Zulu VS. Medicinal plants with antibacterial activity. J Ethnopharmacol.2000; 69: 241-6.
- 3. Shafiei Z, Shuhairi NN, Shah Yap NMF, Sibungkil CA and Latip J. J Evidence-Based Complementary and Alternative Medicine.2012
- 4. Sedighinia F, Afshar AS, Soleimanpour S, Zarif R, Asili J and Ghazvini K. Antibacterial activity of *Glycyrrhizaglabra*against oral pathogens: an *in vitro* Study. *Avicenna Journal of Phytomedicine*.2012; 2(3):118-124.
- 5. Deshpande RR, Kale AA, Ruikar AD, Panvalkar RS, Kulkarni AA, Deshpande NR and Salvekar JP. Antimicrobial activity of Different extract of *Juglansregia* L. against oral microflora. *Int J Pharm Pharm Sci.* 2011, 3(2):200-201.
- 6. Gadhikar, YD and Diwan PD. In vitro antibacterial activity of traditional medicinal plants against oral hygiene, *J.Bionano frontier*, 3 (2), 2010, 244-249
- Diwan PD, Gadhikar YA and Jain SB. Traditional ethnomedicinal plants used for oral health care by tribals of Melghatregion. Dist. Amravati (M.S.), India. *Int. J. Pharm. Sci. Rev. Res.*, 2013; 21(1):301-304.
- 8. Bauer AW, Kirby WM, Sherris JC and Turck M. *Am. J Clin. Pathol.* 1966; 45(4):493-496.
- More G, Shikalangea TE, Lall N, Bontha F and Meyer JM. Antimicrobial activity of medicinal plants against oral microorganisms. *Journal of Ethno pharmacology*, .2008; 119:473-477.
- 10. Wu CD, Darout IA and Skaug N. Chewing sticks: timeless natural toothbrushes for oral cleansing. J Periodontal Res. 2011; 36(5):275-284.
- 11. Diwan PD and Gadhikar YA. Assessment of phytochemical composition and antibacterial activity of different extracts of *Barleria prionitis* leaves against oral microflora to improve dental hygiene. *Asian Journal of Pharmaceutical and Clinical Research*.2012; 5(2):182-184.
- Diwan PD and Gadhikar YA. Assessment of phytochemical composition and antibacterial activity of different extracts of *Merremiae margenata* leaves against oral microflora to improve dental hygiene. International *Journal of Pharmacy and Pharmaceutical Sciences*.2012; 4(3):621-623.

© 2023 | Published by IRJSE