Journal of Cardiovascular Disease Research
ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 03, 2024

Evaluation of the pharmacological effect of *Argeria Nervosa* bojar. plant on respiratory tract infection: A systemic review

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Abstract:

Argyreia nervosa bojar, a traditional and aesthetic medicinal plant is native to the Indian subcontinent. It has a large variety of traditional uses and therapeutically proven activities such as analgesic & anti-inflammatory, anti-cancer, anti-convulsant, anti-diarrheal, anti-fungal, anti-microbial, anti-obesity, antipyretic, anti-stress, anti-ulcer, anti-viral, aphrodisiac, CNS effect, hepatoprotective, hypoglycaemic, immunomodulatory, nootropic, wound healing activity, skin disorders, gonorrhoea, diabetes and sexual disorders. We aimed to systematically analyse pharmacological importance of *A. nervosa* to treat respiratory tract infection. As respiratory tract infection is accompanied with fever, pain, and inflammation. We collected literature from various online databases on antimicrobial, antipyretics, analgesic and anti-inflammatory activity of *A. nervosa.* We analysed the data based on eligibility criteria of the study and noted that, *A. nervosa* has high potential to treat many diseases, but it is ignored by researchers to find its pharmacological effect on respiratory tract infection. Our review found only four appropriate literatures available on various databases. This plant parts were noted effective against microbial activity of *Streptococcus pneumoniae* and *Mycobacterium tuberculosis,* responsible for causing respiratory tract infections. Its extracts also exhibited significant antipyretic, analgesic and anti-inflammatory activity in mice, an experimental model.

Key words: antimicrobial, antipyretic, analgesic, anti-inflammatory

1. Introduction:

Since time immemorial, humans are dependent on vascular plants for their life. Approx 10% of total world vascular plants have medicinal properties, which count around half a million (Pimm et al., 2014). Among them over 9,000 plants are used for medicinal applications across the countries (Alakh et al 2013). A large portion of world medicinal plants, 2,400 species have been documented from India for medicinal use (Tushar et al., 2010). *Argyreia nervosa* bojar, a traditional and aesthetic medicinal plant is native to the Indian subcontinent. It is popular as

elephant creeper and Hawaiian Baby Wood Rose in English and Vidhara or Bidhara in Hindi. It is known as Vruddhadaruka in Ayurveda and is used as medicine from ancient times.

Therapeutically proven activities and traditional uses of this plant are analgesic & anti-inflammatory, anti-cancer, anti-convulsant, anti-diarrheal, anti-fungal, anti-microbial, anti-obesity, antipyretic, anti-stress, anti-ulcer, anti-viral, aphrodisiac, CNS effect, hepatoprotective, hypoglycaemic, immunomodulatory, nootropic, wound healing activity, skin disorders, gonorrhoea, diabetes and sexual disorders (Alakh et al., 2013; Unadkat et al., 2019). In addition, Grover (2021) found the seeds of this plant are hallucinogenic. The therapeutic properties of this plant include antioxidant, immunomodulatory, anti-inflammatory, analgesic, hepatoprotective and aphrodisiac.

Respiratory Tract infections (RTIs) are among the most common diseases among children, which is accompanied by fever, pain and inflammation (McDermott et al.,2017; Jin et al., 2021). Mortality due to RTIs is most common in the elderly and children below five years old (Naghavi et al., 2016). Respiratory tract infections can be divided into upper respiratory tract infections (URTI) and lower respiratory tract Infections (LRTI). Infections of the upper respiratory tract (URTI) are mainly caused by viruses and few bacteria such as *Streptococcus pneumoniae* (Grief, 2013). Lower respiratory infections are caused by a variety of microbes, including bacteria, viruses and fungi. Pneumonia, bronchitis, and tuberculosis are main diseases of LRTI (Otani et al., 2022). RTIs are the most common reason for the administration of antipyretics, anti-inflammatory and analgesic medicines to reduce temperature, body pain and inflammation caused by bacterial, fungal or viral infections (Little et al., 2013).

In this review, we collected literature and analysed data available on the anti-microbial, antipyretics, anti-inflammatory and analgesic effects of *A. nervosa*. These properties of *A. nervosa* extract can be helpful in reducing symptoms of URTI and LRTI caused by microbes.

2. Methods:

2.1 Search strategies: We looked for appropriate published studies using variety of sources in accordance with the Cochrane Collaboration Guidelines for systemic reviews (Higgins and Green, 2011). The search comprised abstracting, referencing and indexing electronic databases libraries released between 2003 and 2023. Pubmed, Wiley and Science Direct databases were included. This survey included all studies on evaluation of the pharmacological effect of

Argeria Nervosa bojar. plant. Additionally, manual searches were done by looking through the reference lists of the studies that were included. The search strategy was as given in table 1.

Table 1: Strategies to search literature

1. PubMed

#1 Search ("Evaluation of the pharmacological effect of Argeria Nervosa bojar. plant for RTI" [MeSH Terms])

#2 Keyword search ("antimicrobial activity of *A. nervosa* extract")

3 Antipyretics activity of *A. nervosa* extract

4 Anti-inflammatory activity of *A. nervosa* extract

#5 Analgesic activity of *A. nervosa* extract

#6 Search ("Importance of ***Argeria Nervosa***" [Title/Abstract])

2. Elsevier database

#1 Keyword search ("Evaluation of the pharmacological effect of Argeria Nervosa plant for respiratory tract infection")

#2 Keyword search ("antimicrobial activity of *A. nervosa* extract")

3 Antipyretics activity of *A. nervosa* extract

4 Anti-inflammatory activity of *A. nervosa* extract

#5 Analgesic activity of *A. nervosa* extract

3. Wiley

#1 'Evaluation of the pharmacological effect of *Argeria Nervosa* plant'

#2 Keyword search ("antimicrobial activity of *A. nervosa* extract")

3 Antipyretics activity of *A. nervosa* extract

4 Anti-inflammatory activity of *A. nervosa* extract

#5 Analgesic activity of *A. nervosa* extract

2.2 Identification of study: All citations had been exported to EndNote and duplicates were removed. Further, citations have been screened through titles as well as abstracts, and the full-text of all appropriate research were acquired and assessed by two reviewers autonomously. **Discrepancies were revealed with the third reviewer to attain harmony.**

2.3 Data extraction: The following were considered as inclusion criteria for the present study: (1) studies that included Evaluation of the pharmacological effect of Argeria Nervosa bojar on respiratory tract infection; (2) Studies focusing on antimicrobial, antipyretics, anti-inflammatory and analgesic activity of *A. nervosa* extract (3) Studies focusing on antimicrobial, antipyretics, anti-inflammatory and analgesic effects of *A. nervosa* extract on animal models (4) peer-reviewed full-text articles which were accessible.

Exclusion criteria included were: (1) Conference articles with only abstracts, editorial comments and recommendations. (2) Studies focusing on activities of *A. nervosa* extract other than mentioned above like immunomodulatory, anti-diabetic etc.

3. Results and Discussion

3.1 Identification of included studies: Studies focusing on pharmacological effect of *Argeria Nervosa* plant on respiratory tract infection, showing antimicrobial, antipyretics, anti-inflammatory and analgesic activity were screened because these activities can be helpful in reducing RTI. No data were available on effect of *A. nervosa* on RTI, but 510 potentially eligible research studies, which involved antimicrobial, antipyretics, anti-inflammatory and analgesic effects of *A. nervosa* were reviewed further. Fifty-five articles were noted duplicate and eliminated from the study and 455 studies were screened further by using titles and abstract. 397 studies do not meet exact inclusion criteria such as *A. nervosa* activity related to respiratory tract infection. Only 158 studies were found suitable and included for thorough analysis of full-text data and only 3 suitable study was found. After screening the reference lists of eligible studies, one other eligible study was retrieved. Finally, 4 studies were included in this review (Fig. 1).

Figure 1: Literature identification strategy

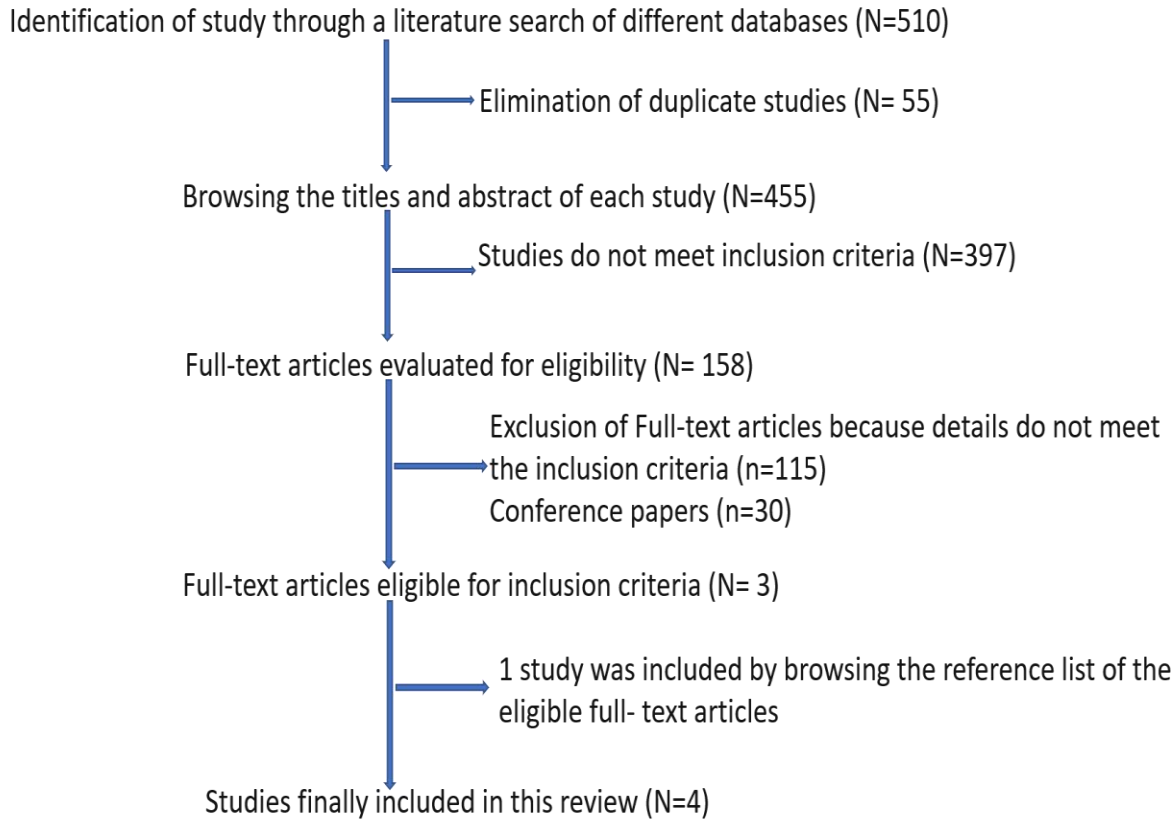

Table 2: List of four relevant studies on evaluation of the pharmacological effect of *Argeria Nervosa* bojar. plant on respiratory tract infection

S.N.	Authors	Activity studied
1.	Padhi et al., (2015)	Antibacterial activity on Streptococcus pneumoniae
2.	Habbu et al (2009)	Antibacterial activity on *Mycobacterium tuberculosis*
3.	Paschapur et al., 2009	Antipyretic activity in experimental animal models
4.	Bachhav et al., 2009	Analgesic and anti-inflammatory activity in experimental animal models

3.2 RTI related antimicrobial activity

Many funguses like Aspergillus, are responsible for infection of RTI. Mahule et al (2012) and Deore et al (2020) found Ethanol extract of *Argyreia nervosa* leaves effective over various species of Aspergillus, however they did not studied species causing Aspergillosis.

Padhi et al., (2015) studied antibacterial activity of *A. nervosa* on RTI causing bacteria Streptococcus pneumoniae. They tested ether, chloroform, ethanol and methanol extracts of *A. nervosa* and found it effective when used in a dose dependent manner. Among the various extracts of methanol extract of *Argyreia nervosa* leaves exhibited high inhibitory zone followed by ethanol, chloroform and petroleum ether.

Habbu et al studied the antimicrobial activity of flavonoid sulphates and various root fractions of A. speciosa against the *Mycobacterium tuberculosis* H37 Rv sensitive strain by using in vitro and in vivo experiments. From the n-butanol portion of the plant's 80% methanolic extract, flavonoid sulphates were recovered. At MIC values of 50 and 25 g/ml, respectively, ethyl acetate (EAAS) fraction of *A. nervosa* and flavonoid sulphates suppressed the growth of M. tuberculosis Rv sensitive strain.

3.3 Antipyretic activity

The ethyl acetate and methanol extract of whole aerial part from *Argyreia nervosa* exhibited antipyretic activity in experimental animal models. The different doses of the extracts were administered to various groups of albino rats. Pathogenic fever was induced by yeast in rata. Its etiologic reason could be the production of prostaglandins, so the antipyretic action of *Argyreia nervosa* extract can be the inhibition of prostaglandin synthesis in the hypothalamus, similar as a possible mechanism of antipyretic action as that of paracetamol (Paschapur et al., 2009). This study noted the antipyretic activity of ethyl acetate and methanol extracts of the aerial part from *Argyreia nervosa*. The reduction in elevated body temperature may be due to the presence of one/more groups of phytoconstituents in the extracts (Jeet et al., 2012).

3.4 Analgesic and anti-inflammatory activities

Methanolic extract (ME) of *Argyreia nervosa* root powder was studied by Bachhav et al., 2009). Male albino mice and male wistar rats were used in their investigation. Utilizing hot plate, tail immersion, and acetic acid-induced belly constriction techniques, the analgesic efficacy of ME from A. speciosa was examined. Using carrageenan-induced rat paw edema, the anti-inflammatory effect of ME of *A. nervosa* roots was investigated. They concluded that, ME of *A. speciosa* exhibited significant analgesic and anti-inflammatory activity in mice.

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