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Exploring the therapeutic potential of Siddha traditional medicine *Eraippu Erumal Chooranam* in managing bronchial asthma: A comprehensive review

Nikil Niva John Raja, Hema Nandhini Devi V, Susila R

ABSTRACT

Bronchial asthma is a prevalent chronic respiratory condition characterized by increased sensitivity within the airways, resulting in significant inflammation, excessive mucus production, and reversible airflow obstructions. Respiratory diseases, particularly asthma, pose a significant challenge in South Asia, with India exhibiting an asthma prevalence rate of 6.3%. Although established pharmacological treatments including bronchodilators and inhaled corticosteroids effectively manage symptoms, prolonged use may lead to undesirable side effects and impose additional strain on healthcare systems. In response to these challenges, there is a strong and growing interest in traditional medicinal practices that provide complementary and alternative therapies for respiratory conditions. The Siddha system of medicine represents an ancient medical tradition primarily practiced in Southern India. This system employs a diverse array of herbal formulations designed to address various health issues, including bronchial asthma. This comprehensive review confidently assesses the therapeutic potential of *Eraippu Erumal Chooranam* (EEC), a traditional polyherbal formulation utilized in Siddha medicine for managing bronchial asthma and related respiratory disorders. An extensive literature review conducted between October and December 2024 draws from classical Siddha texts, respected pharmacopoeias, and esteemed scientific databases such as PubMed, Scopus, Web of Science and google scholar etc. This review systematically compiles and analyses critical data related to the botanical characteristics, phytochemical compositions, pharmacological effects, and historical therapeutic uses of the individual ingredients within this formulation. EEC comprises four distinguished medicinal plants: *Acalypha indica L., Glinus lotoides L., Eclipta prostrata (L.) L.*, and *Piper nigrum L.* Phytochemical analysis has unveiled a rich array of bioactive compounds within these plants, such as flavonoids, alkaloids, saponins, phenolic compounds, and terpenoids. Collectively, these constituents exhibit an impressive range of pharmacological activities essential for asthma management, including bronchodilation, anti-inflammatory responses, antihistaminic effects, antioxidant properties, and immunomodulatory actions. These synergistic properties effectively alleviate airway inflammation, promote relaxation of the bronchial passages, and modulate immune responses critical to the development of asthma. In Siddha medicine, bronchial asthma is understood as resulting from an imbalance of the body's humors, particularly the humor known as *Aiyam*. The individual ingredients of EEC possess unique tastes, potencies, and post-digestive biotransformation effects that contribute to restoring this delicate humoral balance. Given the compelling combination of traditional wisdom and scientific insights, *Eraippu Erumal Chooranam* presents a promising therapeutic option for managing bronchial asthma. However, to establish its safety, efficacy, and mechanisms of action definitively, further systematic preclinical investigations and rigorously designed clinical trials are imperative.

Keywords: Anti-inflammatory, *Acalypha indica*, Bioactive compounds, Flavonoids, Phytochemical Contents, Respiratory disease.

INTRODUCTION

Bronchial asthma (BA) is a chronic respiratory condition that significantly affects the health and daily lives of millions of people worldwide. It is characterized by airway hyper-responsiveness, which means that the airways become overly reactive to various stimuli, leading to constriction and inflammation. This condition is also marked by the presence of inflammation within the airways and an increase in mucus secretion, which can obstruct airflow and further exacerbate breathing difficulties [1].

Individuals with bronchial asthma often experience a range of symptoms, the most common of which include persistent coughing, episodes of wheezing, and shortness of breath, particularly during physical exertion or at night. In some cases, patients may experience chest tightness. Diagnostic tools such as chest X-rays may demonstrate hyperinflation of the alveoli, which is a common finding in patients with poorly controlled asthma. According to estimates provided by the World Health Organization (WHO) for the period from 2020 to 2023, approximately 262 million people are affected by bronchial asthma globally. This considerable prevalence is associated with approximately 455,000 deaths each year, underscoring its severity as a public health issue [2]. Respiratory diseases, including bronchial asthma, are significant contributors to both morbidity and mortality in South Asian countries. Among these nations, India has the highest prevalence of asthma, with an estimated 6.3% of the population being affected. This alarming statistic highlights the urgent need for effective management strategies and public health initiatives aimed at reducing the burden of chronic respiratory diseases [3].

The primary goal of managing asthma is to effectively control symptoms and minimize the risk of future complications, such as sudden and severe asthma attacks known as acute exacerbations. A comprehensive cross-sectional study conducted across eight different countries revealed that 25% of the patients with mild asthma had poorly controlled symptoms. A systematic review highlighted that individuals with mild asthma averaged 2.9 exacerbations annually, emphasizing the frequency of these distressing episodes. Furthermore, 42% of patients face the need for unscheduled visits to their healthcare providers due to urgent asthma-related issues [4]. Effective management of bronchial asthma encompasses a multifaceted approach that includes the utilization of long-acting beta-2 agonists and inhaled corticosteroids, along with strategies to avoid known triggering factors, such as allergens and environmental irritants. Inhalation therapy plays a crucial role in the treatment of bronchial asthma, and is also essential for addressing acute conditions such as status asthmaticus, a severe and potentially life-threatening asthma attack. However, it is vital to consider the potential side effects of inhaled corticosteroids. These medications can adversely affect some patients by disrupting the normal function of the hypothalamic-pituitary-adrenal axis, which may ultimately lead to health concerns, such as osteoporosis. Additionally, prolonged use of corticosteroids can cause a range of side effects, including an elevated risk of infections, development of diabetes, increased blood pressure, and various psychological disturbances. This underscores the importance of careful monitoring and individualized treatment plans for patients with bronchial asthma [5].

Asthma can be caused by a combination of genetic and environmental factors. Various triggers can worsen asthma symptoms including allergens, respiratory irritants, tobacco smoke, air pollution, cold air, and physical exertion. The pathophysiology of asthma involves inflammation and narrowing of the respiratory airways, which leads to compromised airflow and significant breathing difficulties. Because of the complex interplay between genetic, environmental, and physiological factors, it is crucial to pursue individualized treatment strategies that cater to the specific needs of each patient. Patient education is vital for empowering individuals to recognize and manage asthma triggers. Regular monitoring and the establishment of action plans help track symptoms effectively and enable necessary adjustments to treatment. Asthma management often includes medications such as bronchodilators and anti-inflammatory agents such as inhaled corticosteroids, which aim to reduce airway inflammation and improve lung function. While modern pharmaceuticals are widely used worldwide, substantial evidence supports the effectiveness of traditional medicine in treating asthma. Traditional medicine encompasses medical knowledge and practices that have evolved over the generations before the advent of scientific medicine. Traditional medicine typically utilizes plant-based and herbal ingredients administered to patients as concoctions or powdered mixtures. The therapeutic potential of many of these ingredients has been validated through empirical observations, and has been passed down through generations. In several Asian and African countries, up to 80% of the population relies on traditional medicine as their primary source of health care. Traditional medicine has been practiced across various cultures for centuries and has a rich history in the management of asthma [6].

The Siddha system of medicine represents an ancient medical tradition predominantly practiced in southern India. Historical documentation indicates that therapeutic applications of Siddha medicine have been in existence since prior of 10000–4000 BC. This system asserts that the human body comprises “96 principles,” which encompasses physical, physiological, psychological, and intellectual dimensions. The primary components of Siddha medical formulations are various plant parts, minerals, and animal products. The classical literature on Siddha medicine provides a comprehensive classification of diseases based on their pathophysiological characteristics. Numerous traditional Siddha formulations have been utilized for the treatment of diverse ailments, including viral fever, arthritis, skin disorders, and diabetes, particularly in southern India. Furthermore, the Siddha system of medicine plays a significant role in safeguarding individuals against diseases including COVID-19 by offering treatments designed to enhance and protect the immune system. Currently, these immune-boosting therapies are particularly pertinent for promoting health and resilience against infectious diseases [7].

In the Siddha system of medicine, *Chooranam*, which is a medicinal powder, is classified as an internal medicine. The preparation process involves separate pounding and sieving of the purified raw materials, which are subsequently combined in accordance with a specified ratio. In certain formulations, these purified raw materials are mixed according to the prescribed proportions before undergoing powdering and sieving. This medicinal preparation has a shelf life of three months [8]. *“Eraippu Erumal Chooranam*” (EEC) is a polyherbal formulation rooted in Siddha medicine, as delineated in the Siddha classical text, The Pharmacopoeia of Siddha Research Medicines, specifically within chapters 2 to 14, page 110. This formulation comprises four active ingredients and is indicated for the treatment of chronic bronchitis, bronchial asthma, various respiratory conditions, and flatulence [9]. Furthermore, EEC are widely employed in clinical settings for the management of bronchial asthma and its associated complications. This comprehensive review aimed to elucidate the therapeutic potential of EEC in bronchial asthma. The analysis encompasses scientific validation, including a detailed examination of the phytochemical constituents and pharmacological effects, while also integrating perspectives from the Siddha medical tradition.

MATERIAL AND METHODS

The literature review was conducted over a period of three months, from October 2024 to December 2024. Comprehensive information regarding Siddha literature and medicinal properties of various ingredients, including taste, potency, bioavailability, and medicinal applications, was extracted from traditional Siddha texts available at the library of the Siddha Clinical Research Unit at Safdarjung Hospital in New Delhi. The World Health Organization's publication on International Standard Terminologies in Siddha Medicine was used to establish a correlation between Siddha disease terminologies and their English counterparts. The Foundation for Revitalization of Local Health Traditions (FRLHT) – ENVIS website served as the primary source for scientific and vernacular nomenclature (in Tamil, Hindi, and Sanskrit) as well as information regarding the habitat, distribution, family classification, and utilized parts of the plants. The phytochemical compositions and pharmacological activities associated with each medicinal component were compiled from published Siddha literature, bibliographic references, abstracts, and full-text articles accessed through PubMed, Scopus, Web of Science, and various other indexed journals and books. The search was performed using targeted keywords, including bronchial asthma, anti-asthmatic, bronchodilator, anti-inflammatory, *Iraippu noi*, and s*wasakasam*. Data compilation, processing, and statistical analysis

were performed systematically using basic statistical methods in Microsoft Excel 2010.

Ingredients and Standard Operating Procedure of EEC

Table 1 outlines the constituent ingredients of EEC. Figure 1 shows images of the ingredients of the EEC. Ingredients 1 to 4 were lightly fried, finely powdered, and subsequently filtered. All powders, along with white sugar, were thoroughly mixed and stored in an airtight glass container. It is advisable to consume 1–2 g of EEC in honey twice daily.

RESULTS

In EEC formulation, two ingredients have a bitter and pungent taste, while the other one has a pungent taste and another one has a bitter taste. All ingredients associated with digestive bioavailability exhibited a pungent flavor. According to Siddha literature, all four ingredients are primarily linked to respiratory illnesses, as shown in Tables 2 and 3. The pharmacological actions of all the ingredients in BA include bronchodilatory, antiallergic, anti-asthmatic, anti-inflammatory, immunostimulatory, and antioxidant properties. Additionally, the phytoconstituents of each ingredient demonstrated potent pharmacological effects on BA, as shown in Table 4.

Figure 1: *Eraippu Erumal Chooranam* ingredients

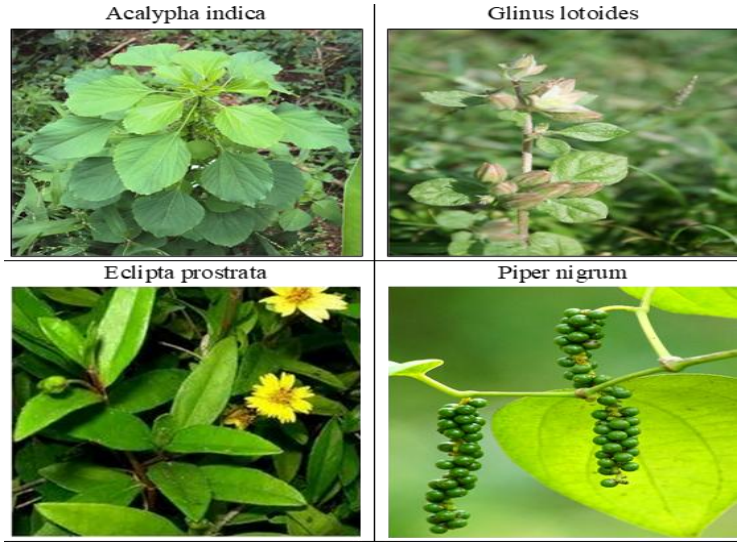

Figure 1: *Eraippu Erumal Chooranam* ingredients

Table 1: *Eraippu Erumal Chooranam* ingredients and parts used [9]

S. no	Name of the Ingredient	Botanical Name	Parts Used
1.	*Kuppaimeni*	*Acalypha indica L.*	Whole plant
2.	*Ciruseruppadai*	*Glinus lotoides L.*	Whole plant
3.	*Porrilai Kaiyan*	*Eclipta prostrata (L.) L.*	Whole plant
4.	*Milagu*	*Piper nigrum L.*	Seed

Table 2: Scientific & selected vernacular names, families of the medicinal ingredients

S. No	Name of the Ingredient/ vernacular name	Sanskrit Name	English name	Hindi Name	Family	Habit
1	*Kuppaimeni*	*aristamanjari*	*Indian acalypha*	*khokali, khokla*	*Euphorbiaceae*	Herb
2	*Ciruseruppadai*	*Bhissata, okharadi, ushandi*	*Prostrate shrub*	*badka, bakada*	*Aizoaceae*	Herb
3	*Porrilai Kaiyan*	*Bhringaraj, Kesaranja*	*Trailling eclipta*	*bhrangraj*	*Asteraceae*	Herb
4	*Milagu*	*Maricha, dhanwantari*	*Black pepper*	*kalimirch*	*Piperaceae*	Climber [10]

Table 3: Morphology, organoleptic characters, and therapeutical uses of the herbal ingredients

Name of the Ingredient	Taste [11]	Potency [11]	Digestive bio-transferring state [11]	Therapeutical uses as per Siddha Medicine [11]
Kuppaimeni (*Acalypha indica L.*)	Bitter, pungent	Hot	Pungent	bronchial asthma, rhinorrhoea, cough with expectoration, cough, constipation, haemorrhoids, arthralgia, abdominal pain, itching.
Ciruseruppadai (*Glinus lotoides L*)	pungent	Hot	Pungent	Cough, urogenital disorders, digestive disorders of children, lancinating pain, acid peptic disorders, leucorrhoea.
Porrilai Kaiyan (*Eclipta prostrata (L.) L.*)	Bitter	Hot	Pungent	Cough, fever, anaemia, jaundice, bronchial asthma, liver diseases.
Milagu (*Piper nigrum L.*)	Bitter, pungent	Hot	Pungent	Cough, ageusia, indigestion, bronchial asthma, anaemia, ear diseases, fever, rhinitis), haemorrhoids, acid peptic disorders.

Table 4: Phytochemical compositions and Pharmacological actions of the ingredients

Name of the ingredient	Phytochemicals	Pharmacological activity	Pharmacological actions in BA
Kuppaimeni (*Acalypha indica L.)*	phenols, saponins, reducing sugars, coumarins, alkaloids, flavonoids terpenoids, tannins, anthraquinones and anthocyanins. Majorly occurred in antimycin A (1.324%), quinone (1.152%), bumetanide (0.847%), oxprenolol (1.118%), choline (0.847%), ramipril glucuronide (1.563%), swietenine (1.134%), and fenofibrate (0.711%) [12]	Anti-inflammatory [13], bronchodilator [14], anti-oxidant, antifungal, anti-bacterial, hepatoprotective, antidiabetic [15], antiasthmatic, wound healing [16], analgesic, cardioprotective, hepatoprotective, antituberculosis [17], antiallergic, antihistaminic, anti-inflammatory, bronchodilatory, and mast cell stabilizing activities [18].	Anti-inflammatory [13], bronchodilator [14], antiasthmatic [16], antihistaminic [18], mast cell stabilizing activities [18].
Ciruseruppadai (*Glinus lotoides L*)	proteins, tannins, flavonoids, alkaloids, terpenes, saponins, anthraquinones, and coumarins [19]. 9-Octadecenoic acid, (49.11%), n-Hexadecenoic acid (25.58%), Octadecanoic acid (6.80%), Stigmasterol (5.25%) and Ergost-5-en-3-ol, (72%) [20].	Anti-inflammatory, anti- oxidant [21], Immunomodulatory, analgesic, antiplasmodial, antifungal, antimicrobial, anthelmintic, hepatoprotective, antihyperlipidemic [22], anti-tumor, chemo-preventive, wound healing, antidiabetic [23], bronchodilator [24]	Anti-inflammatory [21], bronchodilator [24], Immunomodulatory [22]
Porrilai Kaiyan (*Eclipta prostrata (L.) L.*)	coumestan derivatives, triterpene saponins, steroidal saponins, triterpenes, steroids, steroidal alkaloids, flavonoids, phenolic acids, thiophene derivatives [25]	Immunomodulatory, antioxidant, antidiabetic, hepatoprotective, antimicrobial [25], analgesic, anti-nociceptive, anti-inflammatory [26], antiasthmatic [27], bronchodilator [28]	Antiasthmatic [27], bronchodilator [28], Immunomodulatory [25]
Milagu (*Piper nigrum L.)*	Phenolic compounds, alkaloids, flavonoids, carotenoids, terpenoids, etc [29]	anti-inflammatory, anti-asthmatics, immunomodulatory, antioxidant, antitumor, analgesic, antihypertensive, anti-diarrheal, antispasmodic, anticonvulsant, antidepressants, antibacterial, antifungal, hepato-protective, insecticidal and larvicidal activities [30]	anti-asthmatics, anti-inflammatory, immunomodulatory [30]

DISCUSSION

Bronchial asthma is a chronic inflammatory condition characterized by the critical involvement of mast cells, eosinophils, and T lymphocytes. These cellular components play a significant role in airway obstruction and hyper-responsiveness through their bronchodilatory, anti-inflammatory, and antihistaminic effects. In the domain of allergic respiratory disorders, various indigenous therapeutic agents have been successfully evaluated and implemented as conservative asthma treatments. The focus of asthma management has evolved from symptom relief to comprehensive disease control, thereby promoting a patient's overall well-being [31]. In recent decades, there has been an increase in the use of herbal medicines for asthma management, particularly within the realm of traditional medicine, with various formulations employed to treat asthma [32]. Siddha Medicine, an ancient and holistic healthcare system originating in India, addresses both the preventive and curative aspects of numerous ailments. Within the Siddha framework, bronchial asthma is conceptualized as *Iraippu*, encompassing multiple treatment approaches [46]. The EEC formulation comprises four distinct herbal components that have been utilized for respiratory conditions in the Siddha practice for an extended period. Each of these four ingredients exhibits bronchodilatory, anti-inflammatory, antihistaminic, and anti-asthmatic properties.

Ethanolic extracts of *Acalypha indica* leaves (EAIL) show potent anti-asthmatic properties in various experimental animal models [18]. *Acalypha indica* exhibits significant anti-inflammatory properties [33, 34]. The results of these preclinical studies confirmed that *Acalypha indica* possesses strong anti-inflammatory activity. *Acalypha indica* is widely used in traditional medicine to treat bronchitis, asthma, pneumonia, rheumatism, scabies, wounds, hemorrhoids, constipation, insect bites, and other skin diseases [35, 36, 37]. A study by Awan *et al*. showed that the ethanolic extract of *Glinus lotoides* reduced the levels of malondialdehyde, IL-6, and TNF-alpha, while increasing the activities of superoxide dismutase, catalase, and glutathione [21]. Additionally, Nawale *et al*. demonstrated that the hydroalcoholic extract of *Glinus lotoides* exhibited potent anti-inflammatory effects in animal models [38]. These findings suggested that *Glinus lotoides* has significant anti-inflammatory properties in rats. *Glinus lotoides* are widely used for cough, tuberculosis, hiccups, thirst, asthma, wounds [39], Ulcers, Wound healing, antisepsis, diarrhea, liver problems, and externally to cure boils and wounds [40].

The methanolic extract of *E. prostrata* demonstrated efficacy in mitigating bronchial hyper-responsiveness and reducing lung and airway inflammation in a murine model of chronic asthma. This mechanism is attributed to the inhibition of NF-κB activation, likely due to the presence of phytoconstituents such as wedelolactone (WED) and demethylwedelolactone (DMW) [27]. Le *et al*. further elucidated the protective effects of *E. prostrata* constituents against LPS-induced inflammatory responses, highlighting the potential involvement of the NF-κB/IκB pathway in the anti-inflammatory action of 7-O-methylorobol-4′-O-β-D-glucopyranoside [41]. Moreover, investigations conducted by Arunachalam *et al*. revealed that the methanolic extract derived from *Eclipta prostrata* leaves exhibited significant anti-inflammatory properties in albino Wistar rats [42]. *E. prostrata* is widely used in bronchitis, asthma, pneumonia, gastritis, alopecia, liver diseases, grey hair, wounds, constipation, diarrhea, jaundice, and skin diseases [43]. The ethanol extract of *Piper nigrum* has been shown to exhibit substantial anti-inflammatory effects, as demonstrated by Bui *et al*. Their research indicated that this extract inhibits Th2/Th17 responses, suppresses mast cell activation, and reduces both proinflammatory cytokines and inflammatory cells [44]. Additionally, Kausik *et al*. conducted *in vitro* and *in vivo* studies on *Piper longum* Linn, revealing significant antiasthmatic effects in animal models [45]. These findings, along with those of numerous other studies, suggest that *Piper nigrum* may serve as a potential therapeutic agent for asthma and other respiratory disorders.

Substantial evidence from preclinical investigations has revealed that the four ingredients possess significant beneficial properties for asthma treatment, including anti-asthmatic, bronchodilatory, anti-inflammatory, and antioxidant effects. These findings suggest the potential to effectively mitigate asthma symptoms and enhance respiratory function. Moreover, the specific phytochemicals present in these ingredients have demonstrated targeted action against bronchial asthma, indicating a possible mechanism that merits further investigation. Complementing these preclinical results, clinical studies have confirmed the efficacy and considerable benefits of these components in managing bronchial asthma. This evidence indicates their potential significance in developing therapeutic strategies to improve the outcomes of patients with asthma.

In *Iraippu*, the imbalance of *Aiyam* humor negatively affects *Vali*, while *Azhal* humor plays a crucial role in the development of the disease. This interplay ultimately leads to *Iraippu* and its related complications [46].

Diagnostic and therapeutic approaches of the Siddha medical system are rooted in key concepts, such as *Mukkurram* (three humors), *Suvai* (taste), *Veeriyam* (potency), *Vipakam* (post-digestive biotransformation), and *Seigai* (drug action), which are essential for evaluating disease prognosis. Siddha texts emphasize the use of herbs with bitter, astringent, and pungent tastes to counteract elevated *Aiyam* humor. Bitter tastes, composed of air and space, enhance *Vali* humor while reducing *Azhal* and *Aiyam*. They cleanse their bodies and reduce their secretions. Bitters also help in managing *Aiyam* because of their pungent *Vipakam*. Astringent tastes, primarily made of air and earth, similarly increased *Vali* humor and decreased *Azhal* and *Aiyam*. They also function as blood purifiers. Pungent tastes, consisting of fire and air, boost both *Azhal* and *Vali* while lowering *Aiyam*. They stimulate appetite, strengthen the heart, and promote bodily secretions [47]. The components of EEC exhibit a distinctly bitter and pungent flavor profile, characterized by hot potency that intensifies into a more pronounced pungency during post-digestive biotransformation. This formulation is effective in addressing imbalances in aiyam humor and alleviating the clinical manifestations associated with bronchial asthma (BA) and its related complications.

CONCLUSION

Eraippu Erumal Chooranam (EEC), a classical Siddha polyherbal formulation, demonstrates anti-asthmatic, bronchodilatory, and anti-inflammatory potential supported by its phytoconstituents. The traditional rationale of balancing humoral imbalances aligns with modern evidence on its pharmacological effects. EEC shows promise as an adjunctive therapy in bronchial asthma, though further systematic preclinical and clinical studies are essential to validate its efficacy and safety.

Study Limitations

This review is based largely on available Siddha literature, ethnomedicinal evidence, and preclinical data on the individual ingredients of Eraippu Erumal Chooranam. Direct clinical evidence on the complete formulation remains limited, and most studies vary in methodology, dosage, and outcome measures, which restricts comparability. In addition, the absence of large-scale randomized controlled trials and standardized phytochemical profiling limits definitive conclusions on safety and efficacy. Future well-designed clinical investigations are required to validate these preliminary findings and support broader therapeutic application.

List of Abbreviations:

BA	- Bronchial asthma
EEC	- *Eraippu Erumal Chooranam*
WHO	- World Health Organization
FRLHT Traditions	- Foundation for Revitalization of Local Health
ENVIS	- Environmental Information System
IL- 6	- Interleukin-6
TNF	- Tumor Necrosis Factor
WED	- wedelolactone
DMW	- demethylwedelolactone

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Conflict of interest

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