

AMALAKI (EMBLICA OFFICINALE) RASAYNA AS AN ADJUVANT THERAPY IN THE MANAGEMENT OF PAEDIATRIC RECURRENT RESPIRATORY TRACT INFECTION (RRTI): A REVIEW

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ABSTRACT

Paediatric Recurrent Respiratory Tract Infection (RRTI) is most common reason for paediatrician visit and hospitalization and also this is associated with significant morbidity and mortality. According to epidemiological studies it is estimated that around 6% of children younger than 6 years of age present with RRTI. In developed countries, up to 25% of aged < 1 year and 18% aged 1-4 years' experience RRTI. Respiratory infections mainly involving the upper airways are common in children and their recurrence constitutes a demanding challenge for the paediatrician. Every time by knowing that there is viral respiratory infection Paediatrician use antibiotic or he has to use antibiotic for prophylactic purpose. That misuse of antibiotic may have adverse effect on health of children. Antibiotic overuse doesn't just lead to drug-resistant superbugs; it may also permanently wipe out the body's good bacteria. Good bacteria in the gut help people in many ways, including helping make vitamins and boosting immunity. *Rasayana* therapy is one of the most prominent components of *ayurvedic* system of medicine. They sustain the *ojus* status and *bala* in the body and promote *vyadikshmatwa* i.e. immunity. *NaimittikRasayana* is used in diseased person as an adjunct to the specific therapy. The concept of *naimittikrasayana* may also be used as adjunct therapy along with specific modern treatment of different diseases with added advantage. In present work an attempt has been made to elaborate the concept of *NaimittikRasayan* in Ayurveda and role of *Amalaki* (*EmbllicaOfficinalis*) as an adjuvant therapy in lowering the incidences of recurrent respiratory tract infection (RRTI). It is clear from literary study and recent research works that *Amalaki* can be used as *naimittikrasayana* in the management of RRTI.

Keywords: Recurrent Respiratory Tract Infection, Antibiotic, *vyadikshmatwa*, *Naimittik*

INTRODUCTION

Paediatric Recurrent Respiratory Tract Infection (RRTI) is most common reason for paediatrician visit and hospitalization and also this is associated with significant morbidity and mortality. Now

days the role of physician and other healthcare providers has expanded from merely treating disease to implementing measures aimed at health maintenance and disease prevention. Respiratory infections

mainly involving the upper airways are common in children and their recurrence constitutes a demanding challenge for the paediatrician. There are so many children suffering from so called recurrent respiratory tract infection (RRTI). These children with RRI present a herculean task for paediatrician. According to epidemiological studies it is estimated that around 6% of children younger than 6 years of age present with RRTI. In developed countries, up to 25% of aged < 1 year and 18% aged 1-4 years' experience RRTI¹.

Usually, the children with RRTI are not affected by severe alterations and RRTI represent essentially the consequence of an increased exposure to infectious agents due to environmental factors during the first years of life. The frequency of Respiratory infection in children with RRTI shows typical seasonality with the highest rate during autumn and winter². RRTI is a common problem mainly in preschool age, usually due to the presence of unfavourable environmental conditions, including early socialization, as well as the immaturity and inexperience of the immune system³. In infancy and early childhood the immune system encounters antigens for the first time, mounting immune responses and acquiring memory. Young children mix with other children in families or nursery and are exposed to many pathogens and therefore there are more prone to infection and recurrent infections are common⁴. Most of the children are simply having the repeated viral upper respiratory tract infections that are a normal part of growing up.

Rasayana therapy is one of the most prominent components of ayurvedic system of medicine. They sustain the *ojus* status and *bala* in the body and promote *vyadikshmatwa* i.e. immunity. *NaimittikRa-*

sayana is used in diseased person as an adjunct to the specific therapy. The concept of *naimittikrasayana* may also be used as adjunct therapy along with specific modern treatment of different diseases with added advantage.

Materials & Methods

A search was undertaken in MEDLINE (www.pubmed.com) or the PubMed database, using keywords like recurrent respiratory tract infection (RRTI), *NaimittikRasayan*, adjuvant therapy & *Amalaki* (E. Officinale) with their corresponding mesh terms in combination like

OR, AND. Also different Ayurveda classics were studied for concept of *Naimittikrasayana* and *Amalaki* rasayana.

Concept of Recurrent respiratory tract infections

Recurrent infections can be defined as infections that are too more in number, too severe, or too long lasting. Definition of RRI is problematic and clear consensus does not exist. In case of otitis media, a reference standard for occurrence is three episodes within 6 months or four episodes within 12 months. Recurrent infectious rhinitis is usually defined as more than five episodes per year and recurrent pharyngitis or tonsillitis more than three episodes within 12 months⁵. Every definition of RRI is arbitrary and too generic and restrictive.

It has been proposed that to diagnose RRI at least one of the following criteria has to be present⁶:

- 6 respiratory infections per annum,
- 1 respiratory infections per month involving the upper airways from September to April,
- 3 respiratory infections per annum involving the lower airways.

“Physiological” respiratory morbidity

Every time children with RRTI should not be considered for underlying immunological or non-immunological pathology; we should know about physiology of respiratory system of children. Certain number of respiratory infections can be considered as physiological due to the development of immature immune system in these children. The normal frequency of the respiratory tract is six to eight episodes during the autumn and winter in infancy (in children aged 1-5 years) and two to four episodes in older children (aged 6-12 years). Even the higher frequency of respiratory infections can be a source of great worry of the parents or paediatricians, most of the children with RRTI are practically not ill and we are not able to detect any serious underlying illness or disturbance of immune system⁷.

Immunology of recurrent respiratory tract infections

The recurrent respiratory tract infections in infants and children are among the most common cause of admission to the hospital. They are responsible for significant morbidity measured by school days lost. Many factors can play an important role in the genesis of the episodes of RRTI that can act alone or together. In some children, it is possible to detect also transient or permanent immune system deficiencies¹. True immunodeficiency is rare and the first cause of RRTI in the childhood⁸, because both humoral and phagocytic immunity reach their best efficacy during the first fifth or sixth years of age⁹. Typically, children with RRTI are usually not affected by severe alterations of the immune system functions. The majority of these children do not have recognised immunodeficiencies, but some may have low levels of some laboratory parameters, usually of immunoglobulin isotypes or rarely other

immunological parameters such as phagocytosis. Most children with RRI do not have an immunodeficiency. If they do, this is often due to an antibody deficiency. Finocchi et al. (2000)¹⁰ evaluated humoral immune defects in apparently 67 non-atopic patients with recurrent infections.

It is probable, that all the observed non-specific deteriorations of immunity are rather the consequence of repeated viral infections than the predisposing factor leading to RRTI. Various infections (especially viral) can influence immune reaction, cytokine responses and phagocytosis. In the clinical practice, most of the children suffer from the recurrent infections of the upper airways, but in approximately 10-30%, the lower tract is also affected¹¹. The combination of RRI and viral infection can lead to the deeper virus-induced immune dysfunction which can favour the recurrence of further respiratory infections¹².

Risk factors for recurrent respiratory tract infections

The increased prevalence of RRTI in younger children could be attributed to the several factors¹²:

- increased exposure to infectious agents during the first years of life, especially when the child is attending a group of children at preschool- or school facilities,
- General immaturity of the immune system of younger children,
- Social and environmental factors e.g. day-care attendance, family size, air pollution, parental smoking, home dampness.

Adverse effect of over Antibiotic use

Recurrent respiratory tract infections (RRTI) in children are the most frequent reasons for visiting a family doctor, commonly resulting in inappropriate prescrip-

tion of antibiotics. Every time by knowing that there is viral respiratory infection Paediatrician use antibiotic or he has to use antibiotic for prophylactic purpose. That misuse of antibiotic may have adverse effect on health of children. Antibiotic overuse doesn't just lead to drug-resistant superbugs; it may also permanently wipe out the body's good bacteria. Good bacteria in the gut help people in many ways, including helping make vitamins and boosting immunity.

Concept of Rasayana

Literally meaning of *rasayana* refers as the means of obtaining standard of *rasa dhatu*¹³. Ayurveda propounds the concept of *ojus* describing it as the quintessence of all *dhatu*s which is responsible for *bala* i.e. immunity or biological strength to resist the disease. The *rasayana* are the enhancer of *ojus* and *bala* and hence form the most important component of therapeutics. *Rasayana* therapy is one of the most prominent components of ayurvedic system of medicine. Ayurved- the science of life, has two fold objective¹⁴-

- To preserve and promote the healthy person and
- To alleviate the illness of sick person.

Thus it has dual role encompassing both "the health" and "the disease". Ayurveda deliberates extensively on the approach and the methods of preventive and preventive health care. Entire range of *swasthavritta*, *sadavritta*, *achararasayan*, *aahar*, *vihar* and the rejuvenative measures of *rasayantantra* have been developed since antiquity for promotion of health and prevention of disease. *Rasayan* treatments are the powerful means of promotion of health, longevity and prevention of disease. They sustain the *ojus* status and *bala* in the body and promote *vyadikshmatwa* i.e. Immunity. Many *rasayan* drugs of

Ayurveda have been recently demonstrated to possess immune-enhancer activity when tested on scientific parameters. *Rasayana* are divided in many time according to-

- a. **Mode of administration**¹⁵-
kutipraveshik, *Vatatapik* and *Dronipraveshik*
- b. **Purpose**¹⁶- *kamya*, *Naimittik* and *Aajasrik*

Concept of Naimittik Rasayan-

Promoter of specific vitality in specific disease, certain *rasayana* may be used in patients suffering from disease in order to promote the vitality in particular disease, this is called *naimittikrasayana*¹⁶. The concept of *Naimittikrasayan* appears to be subsequent development in *rasayantantra* where specific *rasayanas* were conceived for use in patients of specific disease. This concept emerges in *Sushrutsamhita* and *Dalhana*¹⁶ has explained it more clearly. *NaimittikRasayana* is used in diseased person as an adjunct to the specific therapy. Thus it must be clear that *Naimittikrasayana* is not the specific treatment for particular disease but it should be used as an adjunct to the specific therapy. Thus *naimittikrasayana* may also be used as adjunct therapy along with specific modern treatment of different diseases with added advantage.

There is evidence of so many drugs in *Ayurvedic* classics which can be used as *NaimittikRasayana*. These can be used as either single herb or as compound in the form of *avleha*, syrup, *vati*, *swarasa* or *kwatha*.

*Amalaki*¹⁷ (*EmblcaOfficinalis*) is extensively explained in context of *Rasayana* which can be used as *Naimittikrasayana* in recurrent respiratory tract infection of children. *Amalaki* in various forms can be used as an immune booster or anti-infective in the children suffering from

RRTI. The dose and duration of *Amalaki* is depend upon weight of child, severity of disease and varies according to preparations.

Clinical and experimental evidences of Amalaki (*Emblica Officinalis*)

1. *Emblica officinalis* have been reported to have immunomodulatory properties and a marketed herbal product IMMUE 21 or I 21 (containing *E. Officinalis* as one of its ingredients) has been reported to have immunopotentiating and immunoprophylactic activity¹⁸.
2. Immunomodulatory activities of *Triphala* (*Terminalia chebula*, *Terminalia bellerica* and *Emblica officinalis*) were assessed by testing the various neutrophil functions like adherence, phagocytosis (phagocytic index (P.I) and avidity index (A.I)) and nitro blue tetrazolium (NBT) reduction in albino rats. Study has divulged that oral administration of *Triphala* appears to stimulate the neutrophil functions in the immunized rats and stress induced suppression in the neutrophil functions were significantly prevented by *Triphala*¹⁹.
3. IMMUPPLUS (containing *E. Officinalis*) has been reported to have immunomodulatory activity through humoral and cell mediated immunity²⁰.
4. The higher dose of Septilin (containing *Amalaki*) reduced phagocytic activity of the PMN cells/reticuloendothelial system, but both doses increased the percentage and absolute number of circulating neutrophils, stimulated humoral immunity and suppressed cellular immunity. Thus, Septilin has dual effects on the immune system, with lower doses showing greater stimulant and higher doses showing predominantly suppressant effects²¹.
5. Antioxidant activity of tannoid principal of *E. Officinalis* was investigated on the basis of their effects on rat brain frontal cortical and striatal concentration of oxygen free radical scavenging enzymes like superoxide dismutase, catalase, glutathione peroxidase, lipid peroxidation in terms of thiobarbuturic acid reactive products (Bhattacharya et al.2000)²².
6. Nitric oxide (NO) radical scavenging phenolic principles were quantitatively analysed from *E. Officinalis* by in utero method. It was found that Geraniin showed highest NO scavenging activity among the isolated compound of *Amala*²³ (Kumararan and karunakaran, 2006)
7. Aqueous extract of *E. Officinalis* was found to be a potent inhibitor of lipid peroxidase formation and scavenger of hydroxyl and superoxide radicals in vitro²⁴ (Jose and Kuttan, 1995, Naik et al, 2005).
8. Sookshma *Triphala* (containing *Amala*) treatment effectively reduced mortality and produced localization of abdominal sepsis in dose dependent manner. Wound healing was better in *Sookshma Triphala* treated group than control. *Sookshma Triphala* improved the survival rate and reduced sepsis score, thus it appears to be a promising formulation against infection²⁵.
9. The antibacterial potential of dimethyl sulphoxide (DMSO) extracts from fruits of *Emblica officinalis*-Gaertn, *Terminalia bellerica* Roxb. and *Terminalia chebula* Retz. against *Salmonella typhi* (32 strains) isolated from different human pathogens in agar dilution technique. DMSO

fruit extracts of *E. officinalis* showed potent antimicrobial activity against *S. typhi* whereas *T. bellericawas* found to be highly effective against *S. typhi*. Crude fruit extract of *T. chebula* also showed significant antibacterial activity against 32 different strains of *S. typhi*²⁶.

10. Alcoholic and aqueous extracts of emblica showed positive results against common human pathogens, including bacteria, viruses, and fungi. Activity appears to be stronger against gram-positive bacteria, and only limited efficacy against fungi²⁵.
11. The chloroform soluble fraction of the methanolic extract exhibited significant antimicrobial activity against some Gram positive and Gram negative pathogenic bacteria and strong cytotoxicity having a LC₅₀ of 10.257+₋0.770 ug mL⁻¹. It is concluded that the chloroform soluble fraction of the ripe fruits of *Amalaki* containing alkaloids are biologically active²⁷.
12. Extracts of *Emblica officinalis* fruits possessed potent anti-pyretic and analgesic activity. Preliminary phytochemical screening of the extracts showed the presence of alkaloids, tannins, phenolic compounds, carbohydrates and amino acids, which may be responsible for anti-pyretic and analgesic activities. Study was designed to investigate the anti-pyretic and analgesic activity of ethanol (EEO) and aqueous (AEO) extracts of *Emblica officinalis* fruits in several experimental models. A single oral dose of EEO and AEO (500 mg/kg, i.p.) showed significant reduction in brewer's yeast induced hyperthermia in rats. EEO and AEO also elicited pronounced inhibitory effect on acetic acid-induced writhing re-

sponse in mice in the analgesic test. Both, EEO and AEO did not show any significant analgesic activity in the tail-immersion test²⁸.

13. Alcohol and aqueous extracts of *Emblica* fruit were tested for analgesic and antipyretic activity in mice. Results were similar to those of aspirin, except for response to heat pain model in which *Emblica* had no activity²⁸.
14. It has antimicrobial properties and is used as an antiviral for colds and flu. Constituents of *Amalaki* have been found to be active against a range of organisms including *Staph. Aureus*, *E. coli*, *C. albicans*, *Mycobacterium tuberculosis* and *Staph. Typhosa*²⁹.
15. The anti-tussive activity of *Emblica officinalis* was tested in conscious cats by mechanical stimulation of the laryngopharyngeal and tracheobronchial mucus areas of airways. Results showed that the cough suppressive activity of *E. officinalis* is dose dependent and due to antiphlogistic, antiphlogistic, antispasmodic, antioxidant and mucous secretory activity in the airways. An alcoholic extract of the fruits showed a dose-dependent effect similar to that of dropropizine in cats, but was less active than codeine³⁰.

CONCLUSION:

It is evident from the above analysis that *Amalaki* can be used to combat the recurrent respiratory tract of children as an adjuvant drug. This drug can be used as an effective anti-infective and immune booster agent against the recurrent respiratory disorders of children. Moreover this drug can give better option as an effective prophylactic in recurrent respiratory infection of viral origin where antibiotic is of no use. Their role as an immunomodulator agent is also important in limiting the re-

peated respiratory allergies and potentiating the respiratory system.

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