

## STUDY ON BACTERIAL FLORA IN RHINITIS WITH SPECIAL REFERENCE TO PRATISHYAYA

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### ABSTRACT

Ayurvedic science is based on keen observations drawn with precise accuracy by the ancient *Acharyas*. Similar is the medical research conducted by the elite physicians. Medical research can be broadly classified into fundamental research and clinical research. Clinical research is a key tool which enables to critically analyze the textual knowledge, objectively and scientifically; hence their validity is tested and finally established. Once the concepts are framed on the basis of fundamental research, they are followed by clinical research. This helps in upholding its rationality in practice, the very next step to be performed is a proper documentation. In medical science the observations obtained from studies are always subjective. Here, the condition of rhinitis has been opted for observation and research on microbial flora with special reference to *pratishyaya*. *Pratishyaya* or rhinitis is an *urdhavajatrugatavikara* caused by a multitude of factors. These spectrums of factors include animate and inanimate elements. It remains unanswered whether the *pratishyaya* or rhinitis changes the microbial colonization in the nasal cavity to be specific in the nasal microbial flora. Hence, the present title or the study was intended to analyze and observe the changes of microbial flora in nose or nasal cavity with reference to *vataja*, *pittaja* and *kaphajapratishyaya*.

**Keywords:** *Pratishyaya*, *Urdhavajatrugatavikara*, *vataja*, *pittaja* and *kaphajapratishyaya*.

### INTRODUCTION

Life encompasses the states of health and disease. Ayurveda, the spear-head science deals with these states of life. Various fervent concepts with sturdy bedrocks were laid down for discerning the body. Diagnosis and understanding of a disease is of prime relevance in the field of medicine. In the current era of industrialization and urbanization, one of the major social set back is to meet a clean and hygienic domain. Lack of hygiene can steer way to the origin of contagious diseases. One such type of conditions includes the rhinitis. It is one of the frequently tormenting conditions manifesting in different stages of life. The symptoms of rhinitis resembles with

that of the condition of *pratishyaya*<sup>1</sup> mentioned in the Ayurvedic medical literature. *Pratishyaya* is characterized by symptoms like *naasasrava* (nasal discharge), *ghra-nauparodha* (nasal obstruction), *shira-shoolam* (headache), *shirogauravam* (heaviness of head), *jwara* (fever), *kasa* (cough), *kaphotklesha* (phlegm), *swarabheda* (hoarseness of voice), *aruchi* (anorexia), *klama* (tiredness) and *indriyanamasamrthyam* (malfunctioning of senses)<sup>2,3,4</sup>. These all indicates inflammation of the nasal mucosa. Rhinitis<sup>5</sup> is one of the best examples for contagious disease seen all over the world irrespective of gender, race, region and climate. Once this condition of rhinitis or *pratishyaya* is being left un-

treated, it is potential enough to pave way for conditions like *kasa* (cough), *swasa* (dyspnea), *gandhaanjana* (anosmia), *badharya* (deafness) and even the advanced form of disease such as the *rajayakshma* (severe form of disease with multisystem involvement). The disease *pratishyaya* is elaborately described in the ancient Ayurvedic treatises like *Charaka samhita*<sup>6</sup>, *Susrutha samhita*<sup>7</sup> and *Ashtangahrudaya*<sup>8</sup>. Rhinitis is caused due to exogenous and endogenous factor. They can be infectious or non - infectious in nature. Infectious agents can be those derived from external environment or those that are present in the nasal cavity; to be specific in the nasal microbial flora. Microbial flora refers to the microbes pertaining to the specific locations like the oral cavity, nasal cavity, ear and that which may be discernible with the aid of microscope<sup>9</sup>. Hence, microbial floras are specific ecosystem where the microorganisms are present. The disease may be a result of human micro biome interactions. The same change from one to other and it is wrong to think that all people have similar interaction with microorganisms. It is important to keep in mind the full spectrum of human variable. The sources of variation in host susceptible to microbes includes variation in nutritional status, variation in levels of stress, hormones, variation in genes that confer resistance to microbes, variation in somatic cell nutrition involved in immune system function, physical damage to the tissues can open tissue barrier and lead to infection, finally behavioral differences, promote health and avoid pathogens<sup>10</sup>. Other behaviors also may be potential enough to damage defenses and bring people into contact with pathogenic microbes.

It remains unanswered, whether rhinitis or *pratishyaya* in a patient alters the microbial colonization. Hence the aim of the study was to observe the changes in the bacterial and fungal microbiome when affected with *pratishyaya* in an individual with symptoms as told by different Acharyas and observed microscopically to correlate the microbe with the feature of *naasasrava* and

other symptoms from Ayurvedic point of view.

### Materials and Methods:

**Objectives of the study** includes the study of morphology and characteristic feature of microbes in sample of nasal flora of patients affected with *pratishyaya* and correlate the microbe with feature of *naasasrava* from Ayurvedic point of view.

**Source of data** derived from subjects who were suffering with *pratishyaya*, who had been randomly selected from OPD and IPD of SDM Ayurveda Hospital, Hassan and samples were collected from individuals affected with *pratishyaya*.

**Sample collection (nasal secretion)** of the subjects affected with *pratishyaya* were collected in a sterile container for organoleptic analysis – Colour, consistency, smell, volume of the nasal secretion.

**For collection of nasal swab**, sterile cotton swabs were used to acquire the sample from the nasal cavity of the subjects. These swabs were introduced into the nasal cavity and rubbed smoothly against the nasal mucosa in a circular motion and they were transferred for culture for further identification and characterization – colony and microscopic.

**Microbiological Analysis** was conducted from collected samples including culturing, isolation, macroscopical and microscopical characterization.

### Method for preparation of culture media:

For preparation of 500 ml of Nutrient Agar<sup>11</sup> solid media, 17.5 grams of Nutrient Agar was weighed and mixed with 7.5 grams of Agar Agar. Later the powder mix was dissolved in 500 ml of distilled water and transferred in a conical or flat bottom flask. Mouth of the flask was sealed with cotton plug covered with a layer of paper and tightened with bands to avoid any spilling of liquid from within.

For preparation of 500 ml of Potato Dextrose Agar solid media<sup>12</sup>, 19.5 grams of Potato Dextrose Agar solid media was weighed and mixed with 7.5 grams of Agar Agar. Later the powder mix was dissolved in 500 ml of distilled water and transferred in a conical or flat bottom

flask. Mouth of the flask was sealed with cotton plug covered with a layer of paper and tightened with bands to avoid any spilling of liquid from within.

Later, both the filled containers carrying Nutrient Agar and Potato Dextrose Agar were transferred to the autoclave for sterilizing. They were kept inside till the pressure climbs to 15 pounds/ square inch. Then, the pressure valve was released till 10 pounds/ square inch. Again the knob was sealed to reclaim pressure of 15 pounds/ square inch. And, finally the instrument was switched off, to reduce the pressure inside chamber on its own. Until, needle reached zero reading the lid was not opened. Once pressure was released, the media containers were shifted to spread the liquid media into the Petri plates and cooled.

#### **Inclusion & Exclusion Criteria**

Subjects fulfilling the diagnostic criteria (patients with nasal discharge along with three or four symptoms such as head ache, heaviness of head, obstruction of nasal passage, fever, cough, dysphonia, anorexia, impaired olfaction, tiredness) between the age group of 18 to 60 years, irrespective of caste, religion, gender were enrolled for the study.

Patients with nasal trauma or lesions, polypus rhinitis, rhinitis medicamentosa, other systemic ailments were excluded

#### **Plan for the study**

Subjects fulfilling the diagnostic criteria between the age group of 18 to 60 years, irrespective of caste, religion, gender were selected for the study. Later based on the specially prepared case proforma, subjects were diagnosed with the type of *Pratishyaya*. After diagnosis, nasal swab of nostrils were collected using a sterile cotton swab. Mucus secretion also was collected in a sterile glass container, for further organoleptic studies. Assessment was done on the basis of organoleptic characteristics of nasal secretion and culture of nasal swabbing.

#### **Assessment criteria**

Organoleptic characteristics of nasal secretion and culture of secretion were used for assessment.

#### **Subjective parameter**

Mucus discharge from nose, head ache, heaviness of head, obstruction of nasal passage, fever, cough, dysphonia, anorexia, impaired olfaction, tiredness<sup>13</sup>

#### **Result**

Cross tabulation (crosstab) was performed for discerning the association of microorganisms with various variables like colour of nasal secretion, similarly with the smell, nature, consistency and quantity of the nasal discharge. Cross tabulation is a process or function that combines and or summarizes data from one or more sources into a concise format for analyzing or reporting. Crosstabs display the joint distribution of two or more variables and they are usually represented in a form of a contingency table in a matrix.

#### **Association of Microorganisms with the color of nasal secretion:**

##### **Color:**

1. **Yellow color:** Study shows 100% association of *Staphylococci* with yellow colored nasal discharge, 66% association with *Diplococci*, 50% association with *Tetrad*, 23.33% association with *Yersinia*, 16.66% association with *Streptococci* and 16.66% association with *Bacilli*.
2. **White color:** Study shows 60% association of *Diplococci* with white colored nasal discharge, 60% association with *Staphylococci* and no association with *Tetrad*, *Yersinia*, *Streptococci* and *Bacilli*.
3. **Colorless:** Study shows 11.76% association of *Diplococci* with colorless nasal discharge, 5.26% association with *Staphylococci*, 5.26% association with *Tetrad* and no association with *Yersinia*, *Streptococci* and *Bacilli*.

#### **Association of Microorganisms with the smell of nasal secretion:**

##### **Smell:**

1. **No smell:** Study shows 36.84% association of *Diplococci* with nasal discharge devoid of smell, 26.29% association with *Staphylococci*, 11.53% association with *Tetrad*, 3.84% associa-

- tion with *Streptococci*, 3.84% association with *Bacilli* and no association with *Yersinia*.
2. **Purulent smell:** Study shows 75% association of *Staphylococci* with purulent smell, 50% association with *Diplococci*, 50% association with *Yersinia*, 25% association with *Tetrad*, no association with *Streptococci* and *Bacilli*.

#### Association of Microorganisms with the nature of nasal secretion:

##### Nature:

1. **Mucoid:** Study shows 20.83% association of *Diplococci* with mucoid nasal discharge, 20.83% association with *Staphylococci*, 8.33% association with tetrad and no association with *Yersinia*, *Streptococci* and *Bacilli*.
2. **Mucopurulent:** Study shows 83.33% association of *Staphylococci* with mucopurulent nasal discharge, 66.66% association with *Diplococci*, 50% association with *Yersinia*, 33.33% association with tetrad, 16.66% association with *Streptococci* and 16.66% association with *Bacilli*.

#### Association of Microorganisms with the consistency of nasal secretion:

##### Consistency:

1. **Water:** Study shows 10% association of *Diplococci* with watery nasal discharge, 10% association with *Staphylococci*, 10% association with tetrad, 10% association with tetrad, no association with *Yersinia*, *streptococci* and *Bacilli*.
2. **Thick:** Study shows 100% association of *Staphylococci* with thick nasal discharge, 71.42% association with *Diplococci*, 28.57% association with *Yersinia*, 28.57% association with *Tetrad*, 14.28% association with *Streptococci* and 14.28% association with *Bacilli*.
3. **Viscid:** Study shows 66.66% association of *Diplococci* with viscid nasal discharge, 33.33% association with *Staphylococci* and no association with *Yersinia*, *Tetrad*, *Streptococci* and *Bacilli*.

#### Association of Microorganisms with the quantity of nasal secretion:

##### Quantity:

1. **Scanty:** Study shows 16.66% association of *Diplococci* with scanty nasal discharge, 16.66% association with *Staphylococci*, 11.11% association with *Tetrad* and no association with *Yersinia*, *Streptococci* and *Bacilli*.
2. **Profuse:** Study shows 66.66% association of *Diplococci* with profuse nasal discharge, 66.66% association with *Staphylococci*, 33.33% association with *Yersinia*, 16.66% association with *Tetrad*, 16.66% association with *Streptococci* and no association with *Bacilli*.
3. **Intermediate:** Study shows 50% association of *Staphylococci* with intermediate nasal discharge, 33.33% association with *Diplococci*, 16.66% association with *Tetrad*, 16.66% association with *Bacilli*, no association with *Yersinia* and *Streptococci*.

#### DISCUSSION

Culture was done for the nasal swabs of 30 patients on Nutrient Agar and Potato Dextrose Agar media. The former was to yield the growth of bacteria and latter for facilitating fungal growth. In certain subjects the growth was seen in nutrient media whereas none of the subject's nasal swab culture in potato dextrose agar possessed growth.

The culture growth was correlated with the *nasasrava* characteristics and furnished the below results.

There was 100% growth of *Staphylococci* in the yellow coloured mucous, whereas 60% growth of *Gram negative Diplococci* was seen in the white coloured mucous. The colourless discharge carried an 11.76% predominance of *Gram negative Diplococci*. Hence, from the study, predominance of *Staphylococci* can be correlated with the incidence of colour of *pittajapratishyaya*. Predominance of *Gram negative Diplococci* with that of *kaphajapratishyaya*, and in *vatajapratishyaya* microbes cannot be correlated as the study showed a reduced microbial load in the swab along with the discharge.

With respect to the nasal mucous samples devoid of smell, there is 36.84% growth of *Gram negative Diplococci*, whereas purulent odour carried 75% growth of *Staphy-*

*lococci*. Hence purulent samples in the study indicated a predominance of *Staphylococci*, a potential infectious agent.

Therefore, *vatajapratishyaya* with colourless discharge devoid of smell carried comparatively less number of organisms; hence it cannot be correlated with the microbes. On the other hand *pittaja* and *kaphajapratishyaya* classified under purulent samples can be correlated to the presence of *Staphylococci*.

Based on the quantity of discharge, profuse quantity possessed with good amount of growth compared to the scanty and intermediate quantity. This is because of the favourable substratum for microbes to thrive. But, the study could correlate the predominance of *Gram negative Diplococci* and *Staphylococci* with reference to profuse discharge, a typical symptom of *kaphajapratishyaya*.

Based on the consistency of discharge, watery consistency carried fewer amounts of microbes. Thick discharge carried a 100 % growth of microbes - *Staphylococci* in the sample proving the stage of active infection. Viscid discharge carried a 66.66% predominance of *Gram negative Diplococci* indicating close association with the *kaphajapratishyaya*.

In nature of the discharge, 75% growth of staphylococcus was observed in purulent discharge. Whereas, clear mucoid discharge possessed 20.83% of growth of both *Gram negative Diplococci* and *Staphylococci*.

### CONCLUSION:

The study proves the presence of microorganism in the nasal swab along with the discharge. The study also distinguishes different microorganisms in the sample such as *Gram negative Diplococci*, *Staphylococci*, *Tetrad*, *Streptococci*, *Yersenia* and *Gram negative Bacilli*.

The results of the swab culture also were correlated to the organoleptic features of *nasasrava*.

Yellow coloured mucus sample was correlated with the swab culture collected from patients of *pittajapratishyaya*, carried *Staphylococci*. White coloured mucous

sample was correlated with the swab culture collected from *kaphajapratishyaya*, carried *Gram negative Diplococci*.

Nasal discharge devoid of smell was correlated with the swab culture from *vatajapratishyaya* patients and no significant relation with the microbes except the predominance of *Gram negative Diplococci* was observed. Samples with purulent odour from *pittaja* and *kaphajapratishyaya* patients were correlated with nasal swab culture and showed significant association with *Staphylococci*.

Nasal swab culture of patients was correlated with the thick discharge obtained from *pittajapratishyaya* patients and is highly associated with *Staphylococci* organism. When correlated with the viscid discharge obtained from the *kaphajapratishyaya* patient, it showed association with *Gram negative Diplococci* organism. The watery consistency discharge obtained from *vatajapratishyaya* when correlated with the culture results, a significant reduction in the microbial load was observed. Hence, watery discharge cannot be correlated to any microbes.

Profuse discharge obtained from *kaphajapratishyaya* patients correlated to the culture and is associated with *Gram negative Diplococci* and *Staphylococci* organisms. Scanty and intermediate quantity could not be correlated to any microbes. Therefore, quantity of discharge cannot be correlated to any organisms.

When the nature of discharge was taken, clear mucus discharge or mucoid discharge from *vatajapratishyaya* showed very less growth, hence cannot be correlated with the microbes. But, the mucopurulent discharge obtained from *kaphaja* and *pittaja*-patients possessed more association with *Staphylococci* organism.

Hence, microbes can be correlated to the colour, smell, consistency and nature of the discharge and thereby to the *doshas*. Quantity of discharge cannot be taken to consideration for correlating with microbes. From the study, *Staphylococcus* is more in association with *pitta dosha* and *kaphadosha*. But, from the *nasasrava* of

vatajapratishyaya, significant correlation to the microbe was not possible.

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