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AN AYURVEDIC INTERPRETATION OF SPUTUM CULTURE EXAMINATION: A CONCEPTUAL AND CLINICAL PERSPECTIVE

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ABSTRACT

Sputum culture examination is a critical diagnostic tool for identifying microorganisms responsible for Respiratory Tract Infections (RTI's) and determining appropriate treatment strategies. This laboratory test involves Sputum collection, culture on agar media's like Blood, Cled, MacConkey, etc. However, the rising prevalence of Multidrug resistance (MDR) pathogens possesses significant treatment challenges and limits the therapeutic options which make the patients to opt for alternative treatment like Ayurveda. In Ayurveda, pathogenic microorganisms may be correlated with Krimi (microscopic entities) which are classified into Bahya (External) and Abhyantara (Internal). In Sputum culture examination the commonest Gram-positive microorganisms like Streptococcus and Staphylococcus species may be correlated with Raktaja Krimi by observing the morphology and characteristics of culture plate. Similary, commonest Gram-negative bacteria like Klebsiella, Pseudomonas and Proteus found in Sputum Culture Examination may be correlated with Shleshmaja Krimi based on inhabitation and properties of migration to different regions of the body. These Ayurvedic interpretations highlight similarities in the microscopic structure and pathogenic behaviour of various microorganisms. Integrating Sputum culture with Ayurvedic principles provides a novel perspective, bridging traditional wisdom with modern medicine. The holistic approach not only addresses microbial resistance

but also explores alternative treatment modalities offering a comprehensive strategy for managing RTI's effectively.

KEYWORDS: Sputum culture examination, Respiratory tract infection, Krimi, Raktaja Krimi, Shleshmaja Krimi.

INTRODUCTION

Sputum is composed of tracheobronchial secretions, cellular debris, microorganisms, and saliva. Its characteristics such as amount, colour, consistency and odour which provide valuable clinical information. Both gross and microscopic examinations of sputum assist in medical diagnosis. Sputum culture in particular is an analytical method used to identify bacteria present in sputum expelled from the respiratory tract. This investigation is crucial for determining the causative agents of cough. The primary aim of sputum testing is to detect the pathogens responsible for lower respiratory tract infections (LRTI).[1]

Treating multidrug resistance (MDR) diseases presents substantial hurdles because microorganisms are resistant to several types of antibiotics as the pathogens form biofilm which is responsible for the unmanageable persistence of microbial infection. There are many challenges in treating MDR conditions as there are limited treatment options. So, Patients usually opt for alternative treatment modalities like Ayurveda for this condition. Therefore, the need of Sputum culture examination and its Ayurvedic interpretation is the need of the hour.

MATERIALS AND METHOD

 Study Design: Literary review and conceptual analysis based on classical Ayurvedic texts, commentaries and contemporary research.

 Sources

- Bṛihattrayee's and Laghutrayee's
- Various journals & articles

 METHODOLOGY

- Compilation and categorization of all lakshanas of Krimi
- Constructing a correlation model between Ayurvedic krimi concepts and microbiology.

DISCUSSION

Respiratory Tract Infection can be caused by both Gram-positive and Gram-negative bacteria. The commonest Gram-positive bacteria's of Sputum Culture Examination are Streptococcus[2] and Staphylococcus[3] species, whereas on the other hand the commonest Gram-negative bacteria of Sputum culture examination are Klebsiella[4], Pseudomonas[5] and Proteus[6] species. Bacteria's are not directly mentioned in Ayurveda but the understanding might be derived from the context of Krimi as mentioned in Ayurveda. According to classics, the term "Krimi" describes parasites, worms or other microbes that infiltrate the body and interfere with regular physiological processes. Some Krimi's are said to be Anu (minute) which is in turn microscopic in nature. It is broadly classified into Bahya and Abhyantara Krimi. Bahya Krimi[7] as per Acharya Vagbhata and Madhav, which is an external parasite taking their origin in Mala (excreta), size, features and colour resembles Tila (sesame seed). It basically resides in hair and clothes, have many Pada's (legs) and is Sukshma (small) in nature. They are of two types namely Yuka and Leeksha.

On the other hand, Abhyantara Krimi is an internal parasite which is of 18 types. They are sub classified into Shleshmaja, Raktaja and Purishaja Krimi. Shleshmaja Krimi[8] as per Vagbhata, are of 7 types namely- Antrada, Udaraveshta, Hridayada, Mahakuha, Kurava, Darbhakusuma and Sugandha. It resides in Amashaya.

Raktaja Krimi[9] as per Acharya Vagbhata, are of 6 types namely- Keshada, Lomavidhwamsa, Lomadvipa, Udumbara, Aurasa and Matara. It resides in Raktavahisira.

Purishaja Krimi[10] as per Acharya Vagbhata, are of 5 types namely- Kakeruka, Makeruka, Sausurada, Suluna and Leliha. It resides in Pakwashaya.

Commonest Gram-positive bacteria found in Sputum Culture Examination are- Streptococcus and Staphylococcus species. These are basically found in Throat, Skin, Gastrointestinal tract and Genito-urinary tract. They generally grow in Blood Agar media and show a typical Hemolysis characteristic on the Blood Agar plate. On the other hand, Raktaja Krimi are found in blood. So, Streptococcus and Staphylococcus species may be correlated with Raktaja Krimi. Furthermore, Raktaja Krimi[11], as per Acharya Charaka, which means they are circular in shape, minute, devoid of legs, which makes it comparable to bacteria. Charak has mentioned, when Raktaja Krimi are overly grown, they eat away or destroy the tissues, etc of that particular region; similarly, we can notice the same phenomenon in the blood agar

media as Streptococcus and Staphylococcus species forms clear transparent zone which emerges around the colonies of bacteria that completely lyse the RBC's which is known as Hemolysis.[12] So, from the above understanding, we may correlate Streptococcus and Staphylococccus species of Sputum Culture Examination as Raktaja Krimi.

Gram-negative bacteria found in Sputum Culture Examination are Klebsiella, Pseudomonas and Proteus species. These bacteria's mostly reside in large intestine and it is classified under the group of Enterobacteriaceae[13] which are predominantly aerobic. Even though they reside in the large intestine but can travel to other areas of the body like Respiratory Tract also. According to Acharya Charaka, Shleshmaja Krimi[14] lives in Amashaya, which is also known as Urdhwa (Upper Abdomen) and Adho Amashaya (Lower Abdomen). The krimi can travel to different regions of the body when in excess and can induce many pathologic problems. Similar to bacteria, many Shleshmaja Krimi's are Sukshma in nature, which can be thought of as a microscopic structure. So, bacteria's like Klebsiella, Pseudomonas and Proteus species which resides in intestine (Adho Amashaya) and move to other pathological side may be interpreted as Shleshmaja Krimi.

Purishaja Krimi[15], as per Acharya Charaka, Purishaja Krimi arises from the feces and are found in Pakwashaya. They are big, round, thin or thick, blue, yellow, white or black in colour. As they originate from the feces, big and thin in nature, So, they may be correlated with Helminthes.

CONCLUSION

From the study the following conclusion can be drawn:

1) Gram-positive bacteria of Sputum Culture Examination like Streptococcus and Staphylococcus species may be correlated with Raktaja Krimi.
2) Gram-negative bacteria of Sputum Culture Examination like Klebsiella, Pseudomonas and Proteus may be interpreted with Shleshmaja Krimi.

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