**ABSTRACT**

The product that comes out after coughing is ‘Nishtyuta’ (sputum). It is the secretion of the lungs (Mala rupa kapha) which has become increased, which may contain some amount of Pooya (pus), Rakta (blood), Krimis (microbes) and even Puppusa mamsa (Lung Tissue) in many diseased conditions. It comes out after kasa (cough) easily if it is thin, but when it becomes thick it can be brought out after severe coughing. Examination of Sleshma (sputum) can be done through Roga Pareeksha (Disease Examination) by Darshana (inspection), Sparshana (palpation) and Prashna pareeksha (interrogation). In Ayurveda classics we find very few references regarding Sleshma pareeksha with special reference to Sputum. So this article mainly explains about both Ayurveda and Modern tools for the assessment of Sleshma (Sputum).

**Keywords:** Nishtyuta, sleshma, roga pareeksha, sputum.

**INTRODUCTION**

The product that comes out after coughing is Nishtyuta (sputum). It is the secretion of the lungs (mala rupa kapha) which has become increased, which may contain some amount of Pooya (pus), Rakta (blood), Krimis (microbes) and even Puppusa mamsa (Lung Tissue) in many diseased conditions. It comes out after kasa (cough) easily if it is thin, but when it becomes thick it can be brought out after severe coughing. We have a very few references regarding Sleshma Pareeksha in our classics which are scattered in various Sthanas. It can be understood through Roga pareeksha in Ayurveda and sputum examination in Contemporary context.

Saama Kapha Lakshanas: We can consider Sama Kapha Lakshanas as Sleshma pareeksha in Ayurveda.1

“aaivilastantulaha styanaha kanthadeshe avatish IEEE | samma balaaso durgandhihi kshududgara vigahatakrut ||”
(Ash.Hru.Su.13/37-38)

There is increased turbidity of the kapha (phlegm) which is thick, stagnant in throat, foul smell, complete loss of appetite and obstruct the eructations.

As ‘Kapha’ is mala of ‘Rasa dhatu’ we can consider Sama Rasadhatu malaroopi kapha lakshana for examination of sleshma’. When rasadhatu malarupi kapha combines with aama produces these symptoms: (Cha.chi.18 chapter)

“Sa kapha”

“Sleshmana pittasamsrusta”

“Bahulam madhuram snigdham nshteetvi ghanam kapham”

“Durdandhi hareetam raktam stheevet pooyopamam kapham”

“Picchilam bahalam visram haritam shwetapeetakam kaasamano rasam yashmee nshteetvi kaphaanugam”

2(Cha.Chi.8/51)

“Saandra kapha”3 (su.sam.utt.52/10)

Ayurveda explains abnormalities in Sleshma (sputum) due to affliction of various doshas. It can be assessed by Roga Pareeksha – Trividha pareeksha (3 folds of Examination)- Darshana (inspection), Sparshana (palpation) and Prashna pareeksha (interrogation) or through Pratayaksha (direct observation), Anumana (doubting) and Aptomadesha pramanas (said by elders/guru).

Using Pratayaksha Pramanas (Direct Observation)

- Chakshurendriya (Eye): One has to look for Sleshma Pramana (quantity), appearance of sleshma and consistency of sleshma (sputum).
- Ghranendriya (Nose): Have to look for odour of sleshma (sputum).
- Sparshanendriya (Skin): One has to look for temperature of sleshma (sputum) and consistency of sleshma.

Using Aptomadesha Pramanas: ‘Aptomadesha’ means Verbal or scriptural testimony, told by our Ayurveda Acharyas in Classics. Abnormal features of Sleshma (sputum) is due to affliction of various doshas (like vata, pitta and kapha). By using textual references, we can assess Sleshma (sputum).

**Darshanendriya Pareeksha**: It includes examination same as Chakshurendriya (through eye) pareeksha

**Examples for appearance of Sleshma**

1. Kshayaja Kasa: Harita, Rakta, Pooyopama (green, blood, associated with pus)
2. Kshataja kasa: Shushka kapha, sashonita (dry sputum, associated with blood)
3. Raktaja Pratishyaya (Rhinitis): Rakta srava (blood discharge)
4. Pittaja Kasa: Peeta nshteetvata (yellow sputum)
Nose: Here sleshma will be thin in consistency. 

**Consistency of Sleshma (Sputum):** Assessed as follows;
- Through Chakshurendriya pareeksha: sleshma can be assessed by using dropper. Aspirate the sleshma (sputum) into pipette & then allowing to drop by gravity & observe.
- Through Sparshanendriya: Sleshma can be assessed by using Physician’s hand checking for consistencies. Ex: Vataya Pratishyahya- Tanu srava (thin discharge) ; Kaphaja Kasa- Ghana Kapha (thick sputum).

Relation between various orifices and consistency of Sleshma (Sputum):
Based on the orifices involved and consistency, Sleshma can be classified into three types-

Nose: Here sleshma will be thin in consistency.

<table>
<thead>
<tr>
<th>Features</th>
<th>Vataya</th>
<th>Pittaja</th>
<th>Kaphaja</th>
<th>Rakta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>-</td>
<td>Sapeta</td>
<td>Shukla</td>
<td>Raka</td>
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<tr>
<td>Odour</td>
<td>-</td>
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<tr>
<td>Temperature</td>
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<tr>
<td>Consistency</td>
<td>-</td>
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</tbody>
</table>

Table 1: Assessment of sleshma in pratishya (rhinitis)

<table>
<thead>
<tr>
<th>Features</th>
<th>Vataya</th>
<th>Pittaja</th>
<th>Kaphaja</th>
<th>Kshataja</th>
<th>Kshayaja</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>-</td>
<td>Peeta</td>
<td>-</td>
<td>-</td>
<td>Harita,rakta,paya (green, mixed with blood and pus)</td>
</tr>
<tr>
<td>Temperature</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Odour</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Durgandha (foul smell)</td>
</tr>
<tr>
<td>Consistency</td>
<td>Sushka (dry)</td>
<td>Tanu (thin)</td>
<td>Snigdha,Ghana,Sandra (unctuous, thick )</td>
<td>Initially shushka (dry) later expectorates blood</td>
<td>-</td>
</tr>
<tr>
<td>Quantity</td>
<td>Diminished after expectoration</td>
<td>-</td>
<td>Bahula (large)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2: Assessment of sleshma in kasa (cough)

**Relation Between Varna, Jalanajamajna Pareeksha and Sadhyasadhyata (Prognosis)**

We have scattered references regarding prognosis of patient based on varna (color), of sleshma and jala nimagajna pareeksha (Test based on sinking or floating in water) in Charaka Samhita- Indriya Sthana. Copious expectation of sputum having blue, yellow or red color from the uras (chest), Physician should discard him from a distance. If sputum sinks in water when placed on it, he should be considered as moribund. If several colors appear in sputum of a person and if it sinks in water, he cannot survive.

**Examination of the sputum (contemporary view)**

Examination of Sputum gives invaluable information in Respiratory diseases. This is mandatory in all cases where infections or neoplasia are suspected.

**Introduction:** Sputum is a mixture of bronchial secretions, cells and organisms which are discharged from the airways. Normal sputum may be colourless and mucoid, it is loose and non-sticky in character. Most persons do not spit out sputum. The secretions pass up from the respiratory tract by ciliary action and cough, and are swallowed. Normal quantity does not exceed a few millilitres in 24 hours. If history of sputum is positive, then enquire for its amount, character, viscosity & colour or taste.

**Abnormalities of the sputum**

**Mucoid sputum:** It is clear and viscous. In smokers it may be gray or black in colour. Is usually present in Chronic Bronchitis. It is more copious in the mornings.

**Watery sputum:** This is frothy, voluminous and often blood tinged and seen in Acute Pulmonary Oedema.

**Sticky and Tenacious Sputum:** Whenever infection complicates Chronic Bronchitis or there is exacerbation of Chronic Bronchial Asthma, sputum is presented in this way, which is difficulty to expectorate. Obstruction of the airways by thick secretions worsens the dyspnoea. Expectoration gives relief.

**Purulent sputum:** It resembles pus and it is yellow or greenish. Often it is large in amount and brought out easily with cough. It is a sign of infection seen in Bronchitis, Pneumonia, Lung abscess.

**Rusty sputum:** This is suggestive of Pneumococcal Pneumonia. It is due to admixture of altered blood with sputum. Sputum resembling red jelly results from mixture of mucous and blood and is sometimes seen in Bronchogenic Carcinoma.

**Foul smelling sputum:** It may be present when infection is caused by anaerobic bacteria. May be seen in Bronchiectasis, Lung abscess or Necrotising Pneumonia.

**Reddish brown sputum:** sputum resembling reddish brown or chocolate pus (anchovy sauce pus) is expectorated when Amoebic abscess in the Liver or Lung erodes into a bronchus.
Sputum Examination: It can be discussed under four headings:

1. Collection of sputum
2. Inspection of sputum
3. Gram staining and
4. Microbiological Examination.

Collection of the sputum: A clean wide mouthed sterile bottle should be used for the sputum collection. Most patients find it easier to bring out sputum in the early morning soon after waking up. Sputum brought out from the lower respiratory tract should be collected without contamination by saliva. To assess the total daily output of the sputum it should be collected for 24 hours.

Procedure for sputum smear preparation:

- Make a smear of sputum and fix it by heating over a flame. Pour gentian violet over it for 3 minutes to stain. Pour offf, washe and decolourise with alcohol. Wash with water. Pour carbol fuschin over the smear and heat it from 3 to 5 minutes, taking care not to char the smear and later wash with water. Decolourise with 20% H2SO4 (5% H2SO4 is used for M. leprae) Wash and counter stain with Löffler’s Methylene Blue for 1 minute. Wash and dry the slide and mount under oil immersion.

- Fix the smear by passing it through a Bunsen burner, Sputum sample in a container, Sterile cotton swabs, Glass slides, Pencil / Marker.

- Procedure for sputum smear preparation: Use a sterile cotton swab to extract the specimen from the container. The sample to be used may be drawn up the side of the container with the swab to make selection easier. Mucus can be “cut” with the swab by drawing the swab against the side of the container and thus separating off part of the mucus. Merely dipping the swab into the specimen will not usually provide the best sample. Place the sample on one of the labeled slides. The sample may be transferred from the swab to the slide by a gentle rolling motion of the swab on the slide. Fix the smear by passing it through a Bunsen flame several times. Then stain the sample with general gram staining techniques. Stand the smear in a slide rack and allow the smear to air dry thoroughly. Then microscopic examination of the sputum is done under 100 X oil immersion objective.

- Elements present in the sputum: It can be classified into two:
  1. Cellular elements: Squamous epithelial cells, respiratory epithelial cells, Polymorph nuclear leukocytes and alveolar macrophages,
  2. Non-Cellular elements: Mucus thread, Curschmann’s spirals, Bacteria and Yeast.

DISCUSSION

Sputum is not sterile, so when a person has an infection, there will typically be pathogenic bacteria present. Specific techniques are carried out to identify such bacteria then antimicrobial susceptibility testing is usually performed so that the appropriate antibiotics can be prescribed.

CONCLUSION

There are very few references regarding Sleshma pareeksha in our classics, which are scattered in various shanas of Samhitas. It is considered to occur because of Pranavaha sroto dushti which is due to various nidana sevana. Indriya sthana of Charaka samhita, emphasize on prognosis of patients based on physical appearance of nishtyuta. Saama kapha lakshanas mentioned in classics, can be considered as an important tool for sleshma pareeksha .Early the diagnosis, better will be the prognosis. There is a need for conducting various research on sleshma pareeksha for its better understanding through Ayurveda.

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Cite this article as:

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