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Yasya Shyaaveeyam of Bhela Indriya Sthana - An explorative study

Abstract

Ayurveda is an ancient Indian traditional system of medicine has been in practice since thousands of years. *Maharshi Bhela* was one among the six disciples of *Acharya Punarvasu Atreya* (great preceptor of *Ayurveda*) and colleague to *Maharshi Agnivesha* (author of *Charaka Samhita*). *Maharshi Bhela* has composed *Bhela Samhita* which contains 8 sections (*Sthana*) and 120 chapters (*Adhyaya*). *Indriya Sthana* is one among the eight sections of *Bhela Samhita* and it comprises of 12 chapters. *Bhela Samhita Indriya Sthana* (BSIS) deals with prognostic aspects and contains the description of various emergency conditions associated with poor prognosis. *Yasya Shyaaveeyam* (YSV) is the fifth chapter of BSIS contains the description of terminal illnesses and / or end-of-life stages. Studies on BSIS have been lacking and the present work is aimed to explore the contents of YSV of BSIS. Various conditions such as Wilson's disease (WD), IgA vasculitis, Henoch-Schönlein Purpura (HSP), allergic purpura, consequences of increased intra-abdominal pressure (IAP) and intra-thoracic pressure, abdominal and pelvic malignancies, abdominal compartment syndrome (ACS), disseminated intravascular coagulation (DIC), chorea, auto-immune chorea, neuroacanthocytosis, polycythemia with chorea, Simmond's disease, pituitary cachexia, erythromelalgia, red ear syndrome (RES), red scrotal syndrome (RSS), acute myocardial infarction (AMI), gastroesophageal reflux disease (GERD), non-cardiac chest pain (NCCP), cachexia, sarcopenia, malnutrition, hypercatabolism syndromes, acute abdomen, upper gastrointestinal carcinomas, paradoxical heat sensations, scieropia, glaucoma, achromatopsia, organic brain diseases, pharmacokinetic and pharmacodynamic alterations of drug actions in terminal illnesses, sensory deficits and abnormal perceptions, dementia, delirium, and non-beneficial treatment (NBT) at end of life (EOL) stages are documented in this chapter by *Maharshi Bhela*. The present study paves the path for future research directions.

Keywords: *bhela samhita,* cachexia, chorea, dementia, delirium, *indriya sthana*

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Introduction

Ayurveda is an ancient Indian traditional system of medicine that has been in practice since thousands of years. *Maharshi Bhela* was one among the six disciples of *Acharya Punarvasu Atreya* (great preceptor of *Ayurveda*) and colleague of *Maharshi Agnivesha* (author of *Charaka Samhita*). *Maharshi Bhela* has composed *Bhela Tantra* which later developed as *Bhela Samhita*. *Maharshi Bhela* was contemporary to *Maharshi Agnivesha* (1000-2000 BC). *Bhela Samhita* consists of 8 *Sthanas* (sections) and 120 *Adhyayas* (chapters). *Indriya Sthana* is one among the eight sections of *Bhela Samhita* and it comprises of 12 chapters. *Indriya Sthana* deals prognostic aspects and contains the description of various emergency conditions associated with poor prognosis.[1]

Yasya Shyaaveeyam (YSV) is the fifth chapter of *Bhela Samhita Indriya Sthana* (BSIS). This chapter consists of 16 verses describing various *Arishta Lakshanas*.[2&3] Previous studies on *Charaka Indriya Sthana* & BSIS have explored their clinical significance and prognostic potential.[4-24] Contents of YSV of BSIS are unique from that of *Yasya Shyaava Nimitteeyam* (ninth chapter) of *Charaka Indriya Sthana*.[12] Studies on BSIS are scarce. The aim and objective of the present work is to explore the contents of the fifth chapter of BSIS with the help of contemporary medical literature regarding its clinical and prognostic significance.

Review methodology

A literature search has been undertaken. *Ayurvedic* literature of BSIS and *Charaka Indriya Sthana* has been collected from different published versions of *Bhela Samhita* & *Charaka Samhita* (including their commentaries). Relevant other classical texts of *Ayurveda* have also been referred. Relevant key words have been used (both *Ayurvedic* and terms related to contemporary medicine) for search. Various databases have been used for search. Full text articles with open access and abstracts, which were published in English language, were only considered. Articles published until June 2021, were only considered irrespective of their publication year or date of appearance. No filters were applied during search.

Discussion

The word YSV may denote manifestation of brownish discoloration or pigmentation of eyes and it denotes an imminent death. Like other chapters of BSIS, YSV also deals with various emergency conditions seen in patients suffering with terminal illnesses and may denote an imminent death.[3] This chapter contains 16 verses that are explored (Table 1) in the following sections.

'Yasya shyaave ubhe netre -- phalitam tasya jeevitam' (Verse 1).[3]

According to verse 1, manifestation of brownish (*Shyaava*) and / or greenish (*Harita*) discolouration or pigmentation of both eyes (*Ubhe Netre*) along with headache / some other cranial pathology (*Shiro Roga*) indicates an imminent death (*Phalitam Tasya Jeevitam*). .[3] The present verse may denote various conditions such as 'Wilson's disease' (WD) or 'Osler's sign' or 'Nevus of Ota'. The clinical picture of WD may be asymptomatic or simple acute self limited hepatitis like illness or autoimmune hepatitis or recurrent jaundice

(*Harite Ubhe Netre*), cirrhosis without or with portal hypertension or acute liver failure (*Phalitam Tasya Jeevitam*). Fulminant WD is frequently associated with haemolytic anaemia, severe coagulopathy, encephalopathy (*Shiro Roga*), and quickly progressive renal failure. Patients with WD and symptomatic hepatic decompensation may present with ascites, jaundice (*Harite Ubhe Netre*), gastrointestinal bleeding or hepatic encephalopathy (*Shiro Roga*). Patients with liver cirrhosis are prone to sepsis and it is one of the leading causes of death (*Phalitam Tasya Jeevitam*). In advanced stages of cirrhosis, hepatic encephalopathy (*Shiro Roga*) and hepatorenal syndrome may occur and show high mortality (*Phalitam Tasya Jeevitam*). Ofactory dysfunction, oculomotor impairment, taste dysfunctions and headache (*Shiro Roga*) etc neurological features can be seen in WD. Eye manifestations of WD include the Kayser-Fleischer ring (KF rings) and sunflower cataract. The KF ring is caused by copper accumulation in the descement membrane and appears as golden, brown (*Shyaave Ubhe Netre*) or green colouration (*Harite Ubhe Netre*) at the periphery of the cornea.[17] Osler's sign is the scleral discoloration or pigmentation (*Shyaave* or *Harite Ubhe Netre*?) which involves the entire thickness of the sclera and is the major cause of morbidity associated with the disease (*Phalitam Tasya Jeevitam*). A diagnosis of alkaptonuria can be made based on the triad of scleral pigmentation, arthritis, and black urine.[18] Nevus of Ota is a dermal melanocytosis (*Shyaave* or *Harite Ubhe Netre*?) seen along the distribution of maxillary and ophthalmic branches of the trigeminal nerve (*Shiro Roga*?). Nevus of Ota associated with benign cutaneous and leptomeningeal conditions can be seen in phakomatosis pigmentovasculari, Klippel-Trenaunay syndrome, Sturge-Takayasu disease, nevus flammeus, Weber syndrome, and neurofibromatosis.[19]

Table 1 Contents of *Yasya Shyaaveeyam*

Verse	Relevant condition
'Yasya shyaave ubhe netre -- phalitam tasya jeevitam' (B. I. 5 /1)	Wilson's disease (WD); Osler's sign; Nevus of Ota;
'Haritaashcha sira yasya -- tatraiva sa vinashyati' (B. I. 5 /2)	IgA vasculitis; Henoch- Schönlein Purpura (HSP); Allergic purpura; Cirrhosis of liver;
'Yasya urdhwa vata -- paretam tasya jeevitam' (B. I. 5 /3)	Increased intra-abdominal pressure (IAP) & intra-thoracic pressure and their consequences due to abdominal or pelvic malignancies or metastases; Abdominal compartment syndrome (ACS);
'Gaatre cha paani paade cha -- paretam tasya jeevitam' (B. I. 5 /4)	Movement disorders due to cerebrovascular pathology; Chorea; Disseminated intravascular coagulation (DIC); Autoimmune chorea; Neuroacanthocytosis; Polycythemia with chorea;
'Vrushanau paani paadau cha -- paretam tasya jeevitam' (B. I. 5 /5)	Simmond's disease; Pituitary cachexia;
'Hanu hastau cha paadau cha -- paretam tasya jeevitam' (B. I. 5 /6)	Erythromelalgia; Red ear syndrome (RES); Red scrotum syndrome (RSS);
'Hrudayam dahyate yasya -- paretam tasya jeevitam' (B. I. 5 /7)	Acute myocardial infarction (AMI); Gastroesophageal reflux disease (GERD); Non cardiac chest pain (NCCP);
'Apasmara kshaya kushtam -- paretam tasya jeevitam' (B. I. 5 /8&9)	Cachexia; Sarcopenia; Malnutrition; Hypercatabolism syndrome;
'Hrudayam dahyate yasya -- paretam tasya jeevitam' (B. I. 5 /10)	Oesophageal carcinoma; GERD; upper gastrointestinal emergencies;
'Amsaabhitaapa jantunaam -- paretam tasya jeevitam' (B. I. 5 /11)	Referred shoulder pain due to diaphragmatic irritation caused by abdominal or thoracic pathologies; Intra abdominal malignancies; Acute abdomen; Stomach or pancreatic or oesophageal or liver carcinoma;
'Vaapitam jwalitam martya -- durlabham tasya jeevitam' (B. I. 5 /12)	Paradoxical heat sensations; Scieropia; Achromatopsia;
'Yashchaapi vimale surye -- paretam tasya jeevitam' (B. I. 5 /13)	Glaucoma; Organic brain diseases; Organic psychosis; Visual perceptual distortions (VPD);
'Yam rasa naavatishtate -- na cha jeevati taadrusha' (B. I. 5 /14)	Cachexia; Sarcopenia; Malnutrition; Pharmacokinetic & pharmacodynamic drug alterations in terminal illness; Sensory deficits or sensory senescence; Perceptual abnormalities; Dementia; Delirium;
'Vaanaspatya phalam moolam -- na cha jeevati taadrusha' (B. I. 5 /15)	Non-benefit treatment (NBT) at End of life (EOL) stages;
'Ityetaani bhishag drushtva -- yashomaargapratikshayaa' (B. I. 5 /16)	Clinical decision making at palliative care or hospice care; Medical etiquette at EOL stages;

(B. I. 5 /XX): B - *Bhela samhita*; I - *Indriya sthana*; 5 - Fifth chapter; XX- *Verse* number;

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'Haritaashcha sira yasya -- tatraiva sa vinashyati' (Verse 2)[3]

According to verse 2, person who develops greenish discoloration of veins (*Haritaashcha Sira*) along with purpura (*Romakupaashcha Lohita*) after eating sour foods (*Bhunkte Annaani Saamlaani*) will die soon (*Vinashyati*).[3] In *Charaka Indirya Sthana*, similar verse has been mentioned in *Yasya Shyaava Nimitteeyam* (ninth chapter) with few variations. *Romakupaashcha Samvruta* and *Amlaabhilaashi* were used in *Charaka Indriya Sthana* instead of *Romakupaashcha Lohita* and *Bhunkte Annaani Saamlaani* of BSIS respectively. Green coloured veins (*Haritaashcha Sira*), peripheral vasoconstriction (which leads to reduced sweating) (*Romakupaashcha Samvruta*) and craving for sour foods (*Amlaabhilaashi*) indicates a condition of portal hypertension / cirrhosis of liver.[12] The present verse may denote a condition of 'Allergic purpura' that develops specifically after eating sour foods and can cause death. Henoch-Schönlein Purpura (HSP) or IgA vasculitis is the most common vasculitis associated with viral and bacterial infections, vaccinations or allergens (*Bhunkte Annaani Saamlaani*?). These allergens include drugs, food (*Bhunkte Annaani Saamlaani*?), and exposure to cold or insect bites. The most common clinical manifestations of this type of vasculitis are cutaneous lesions such as erythematous-violaceous, pruritic and exanthematous, appearing as small vesicles or ulcers (*Romakupaashcha Lohita*).[20] Macular purpura (*Romakupaashcha Lohita*) exhibits colour variations from red-blue to violet, green (*Haritaashcha Sira*), yellow, or brown due to extravasation of erythrocytes. Idiopathic capillaritis is the most frequent form and it is caused by a cutaneous hypersensitivity reaction that leads to capillary fragility and permeability, causing erythrocyte extravasation along with hemosiderin deposits.[25] The present verse may denote an allergic condition (aggravated by sour foods?) that causes cutaneous hypersensitivity reaction, vasculitis (greenish veins due to hemosiderin deposits) and purpura (*Romakupaashcha Lohita*).

'Yasya urdhwa vata -- paretam tasya jeevitam' (Verse 3)[3]

As per verse 3, the aggravated upward moving *Vata* (*Urdhwa Vata*) enters in to the stomach / chest (*Aamaashayam Gata*) and seizes up the heart (*Hrudayam Parigruhya*) and ultimately leads to death (*Paretam Tasya Jeevitam*).[3] The physiological location of *Vata Dosha* is *Pakwashaya* / *Adho Naabhi* (hind gut / lower abdomen / below umbilicus). Aggravated *Vata* leaves its physiological location (below umbilicus / pelvic cavity) and moves upwards (reaching abdominal and thoracic cavities) exerts pressure effects in those cavities where it reaches. *Urdhwa Vata* is a condition of upward moving *Vata Dosha*, which can increase the pressure in abdominal (intra-abdominal pressure) and thoracic cavities (intra-thoracic pressure).[26] The present verse may denote a condition of an elevated intra-abdominal pressure (IAP), intra-thoracic pressure and/or intracranial pressure (ICP) and their pathological consequences. Elevated IAP (*Urdhwa Vata*?) has a direct effect on pulmonary functions such as reduction of pulmonary compliance, functional residual capacity, total lung capacity, and residual volume. Respiratory failure (*Paretam Tasya Jeevitam*?) secondary to hypoventilation occurs due to elevation in IAP. Pulmonary vascular resistance increases due to increased intra-thoracic pressure (*Urdhwa Vata*?). Increased IAP is frequently associated with reduction in cardiac output (*Hrudayam Parigruhya*). Elevated intra-thoracic pressure causes cardiac compression (*Hrudayam Parigruhya*). These derangements cause increased heart rate and contractility (*Hrudayam Parigruhya*).[27]

Increased IAP (*Urdhwa Vata*?) is transmitted to the pleural space (*Aamaashayam Gata*?). Elevated IAP along with increased pleural pressure causes direct compression of the heart (*Hrudayam Parigruhya*).[28] Intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS) (*Urdhwa Vata*?) can cause significant morbidity and mortality (*Paretam Tasya Jeevitam*). Increased IAP can cause significant impairment of pulmonary, cardiac, renal, hepatic, gastrointestinal, and central nervous system functions. Diaphragmatic elevation and increased intra-thoracic pressure cause cardiac compression (*Hrudayam Parigruhya*) reducing ventricular compliance and contractility. IAP is transmitted to the thorax and cause deviation of the diaphragm (*Urdhwa Vata*).[29] The present verse may denote an elevated IAP or intra-thoracic pressure and ICP and their fatal consequences.

'Gaatre cha paani paade cha -- paretam tasya jeevitam' (Verse 4) [3]

According to verse 4, the person who has been suffering with abnormal involuntary movements (dancing movements) (*Nrutyati*) and developing blood clots (*Sonitam Sushyati*) all over the body (*Gaatre*) or specifically in hands (*Paani*) and feet (*Paada*) will die soon (*Paretam Tasya Jeevitam*).[3] The present verse may denote neurological manifestations due to cerebrovascular pathology. Vascular disease (*Sonitam Sushyati*), affecting the basal ganglia, is one among the various causes of generalized chorea (*Nrutyati*). Due to cumulative vascular lesions (*Sonitam Sushyati*), the nature of chorea may be intermittent. Chorea comes under the category of hyperkinetic movement disorders and it is characterized by brief, involuntary, irregular and sudden movements (*Nrutyati*). Small deep infarcts (*Sonitam Sushyati*) associated with small vessel disease is the most common sub type of stroke causing abnormal movements (*Nrutyati*). Cerebrovascular disease is the most common cause of sporadic chorea.[30] An increased activity of platelets with aggregation in the cerebral microcirculation (*Sonitam Sushyati*) was produced by experimental cerebral ischemia, and intravascular coagulation (*Sonitam Sushyati*) also was demonstrated during an epileptical seizure (*Nrutyati*?) with cerebral ischemia.[31] Generalized activation of coagulation (*Sonitam Sushyati*) occurs in disseminated intravascular coagulation (DIC) and it is associated with the occlusion of both medium and small sized vessels. Antiphospholipid syndrome (APS) is an accelerated form of this syndrome and causes multi organ failure (*Paretam Tasya Jeevitam*). The clinical picture of DIC, thrombotic microangiopathic haemolytic anaemia (TMHA), and APS may overlap. Patients with systemic lupus erythematosus (SLE) may show the features of APS such as chorea (*Nrutyati*).[32] Autoimmune chorea is associated with various conditions such as SLE, APS, arterial or venous thrombosis, Sjögren syndrome, autoimmune thrombocytopenic purpura, rheumatoid arthritis, autoimmune thyroid disease, and diabetes mellitus.[33]

Hemiballism is also a form of hyperkinetic disorder, characterized by vigorous (with wide amplitude) involuntary and irregular movements of the limbs (*Nrutyati*). Ballism (*Nrutyati*) (a severe form of chorea), is characterized by a violent movements with flinging quality. The most common finding in hemiballism is a lesion of the contralateral subthalamic nucleus (STN) of vascular origin (*Sonitam Sushyati*).[34] Sickle cell trait can produce sickling manifestations due to vaso-occlusive complications (*Sonitam Sushyati*) under conditions of severe hypoxia. Patients with sickle cell disease may develop chorea (*Nrutyati*).[35] Chorea-acanthocytosis (CHAC) is characterized

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by chorea (*Nrutyati*) and blood cells having abnormal morphology (acanthocytosis) (*Sonitam Sushyati*?). Dystonia, seizures, and tics (*Nrutyati*) are the other features of CHAC.[36] Neuroacanthocytosis (NA) is characterized with progressive degeneration of basal ganglia (may leads to *Nrutyati*) associated with red blood cell acanthocytosis (may cause *Sonitam Sushyati*?).[37] Chorea (*Nrutyati*) is a rarely reported complication of polycythemia (may cause *Sonitam Sushyati*?). Neostriatal hyperviscosity syndrome (*Sonitam Sushyati*) is the cause of chorea seen in the cases of polycythemia.[38] The present verse may denote various neurological manifestations like chorea or ballismus or abnormal involuntary movements caused by cerebrovascular pathology.

'Vrushanau paani paadau cha -- paretam tasya jeevitam' (Verse 5) .[3]

As per verse 5, the person who has been suffering with testicular atrophy or testicular volume loss (*Vrushanau Shushkam*), atrophy of hands (*Paani*) and feet (*Paada*), dry mouth (*Shushkam Mukham*) and dry skin or complexion (*Shushka Chavi*) will die soon (*Paretam Tasya Jeevitam*).[3] The present verse may denote a condition of pituitary cachexia or anterior pituitary insufficiency. Pituitary cachexia or cachexia hypophyseopriva or Simmond's disease is characterized by progressive weight loss and cachexia (*Shushkam*), loss of libido, falling of axillary and pubic hair, decrease in basal metabolism, trophic changes in the skin (*Shushka Chavi*) and mental torpor with terminal coma (*Paretam Tasya Jeevitam*) accompanied by hyperpyrexia. The primary lesion involves the anterior pituitary due to a nonspecific atrophy or fibrosis, adenoma or other neoplasm, cysts, tuberculosis, syphilis, or trauma. Extensive destruction of the anterior pituitary can occur without the syndrome of Simmond's disease. There are exogenous and endogenous types of pituitary dysfunction and the endogenous type usually produce the Simmond's syndrome.[39] Simmonds's disease is synonymously used as Simmonds's cachexia, pituitary emaciation and panhypopituitarism.[40] Marked weight loss with emaciation (*Shushkam*), diminished sexual function, low basal metabolic rate, asthenia, premature senililty, dry skin (*Shushka Chavi*) and hair, atrophy of the jaw bone, hypoglycaemia, secondary anaemia, and testicular atrophy in males (*Vrushanau Shushkam*) are the clinical features of hypophyseal cachexia / Simmond's disease. The prognosis is usually grave (*Paretam Tasya Jeevitam*).[41] Clinical picture of anterior pituitary insufficiency is largely variable. Combinations of thyrotropic, gonadotropic and adrenocorticotropic hormone deficiencies with resultant failure of the corresponding target glands commonly found. Gonadal deficiency, hypothyroidism, adrenocortical deficiency, severe hypoglycaemia, hyponatremia, electrolyte disturbances (*Shushkam Mukham* due to electrolyte imbalance) and diabetes insipidus (*Shushkam Mukham* due to dehydration?) can be seen in anterior pituitary insufficiency.[42] Loss of lean body mass, muscle wasting (*Shushka paani & Paada*), testicular atrophy (*Vrushanau Shushkam*), decrease in testosterone levels and hypogonadism were found in mice with cancer cachexia (*Shushka*).[43] The present verse may denote pituitary cachexia or cancer cachexia.

'Hanu hastau cha paadau cha -- paretam tasya jeevitam' (Verse 6) [3]

According to verse 6, the patient suffering with erythema or burning sensation (*Dahyate*) of lower jaw or cheeks (*Hanu*?), ears, hands (*Hasta*), feet (*Paada*), scrotum (*Vrushanau*) and penis (*Linga*) will die soon (*Paretam Tasya Jeevitam*). .[3] The present verse indicates either erythromelalgia (EM) or peripheral neuropathy. EM is characterized by episodes of burning pain (*Dahyate*), erythema (*Dahyate*), and elevated temperature (*Dahyate*), affecting the limbs (*Hastau Cha Paadau Cha*), and also ear (*Hanu*?), face, neck, and the scrotum (*Vrushanau*). Erythema with pain and elevated temperature (*Dahyate*) can be seen in EM, red ear syndrome (RES) (*Hanu Dahyate*), and red scrotal syndrome (RSS) (*Vrushanau Dahyate*). EM restricted to either vulva or ears is considered a special phenotype. RSS is characterized by pain, burning sensations (*Dahyate*), redness of the scrotum (*Vrushanau Dahyate*), and the penis (*Linga Dahyate*).[44] The present verse may also denote neuropathy as a secondary manifestation of various underlying fatal conditions.

'Hrudayam dahyate yasya -- paretam tasya jeevitam' (Verse 7) [3]

According to verse 7, the person who has been suffering with cardiac or chest pain with burning character (*Hrudayam Dahyate*) will die soon (*Paretam Tasya Jeevitam*).[3] The present verse may denote conditions like acute myocardial infarction (AMI) or non cardiac chest pain (NCCP) or gastroesophageal reflux disease (GERD) and its associated complications. AMI is a cardiac emergency (*Paretam Tasya Jeevitam*). The most common symptom of AMI is chest pain. Ischemia is characterized by a feeling of a heavy pressure on chest or squeezing or a burning feeling (*Hrudayam Dahyate*), or dyspnoea. Patients of AMI may present with chest pain with burning character (*Hrudayam Dahyate*).[45] Patients with NCCP complain burning or squeezing substernal chest pain (*Hrudayam Dahyate*). Frequent typical GERD symptoms are independently associated with NCCP.[46] Oesophageal pain has many patterns such as burning (*Dahyate*), gripping, pressing, boring, or stabbing and resembles with that of cardiac pain.[47] The present verse indicates cardiac emergency condition such as AMI.

'Apasmara kshaya kushtam -- paretam tasya jeevitam' (Verse 8&9) .[3]

According to verses 8 and 9, the person who has been suffering with chronic diseases such as *Apasmara* (seizures), *Kshaya* (tuberculosis or cachexia), *Kushta* (skin diseases), *Raktapitta* (bleeding disorders), *Udara* (ascites), *Gulma* (neoplasms), *Madhumeha* (diabetes) and other chronic conditions (*Deergha Roga*) along with depletion of strength & muscles (*Bala Mamsa Kshaya*) and weakening of voice (*Swara Haani*) will die soon (*Paretam Tasya Jeevitam*).[3] Similar condition has been explained in the ninth chapter (*Yasya Shyaava Nimitteeyam*) of *Charaka Indriya Sthana*..[12] According to *Charaka Indriya Sthana*, chronic disease conditions like *Vatavyadhi* (neurological disorders), *Apasmara*, *Kushta*, *Shopha* (edema), *Udara*, *Gulma*, *Madhumeha* and *Rajayakshma* (tuberculosis or cachexia) etc can induce cachexia (*Bala Mamsa Kshaya*) or sarcopenia and ultimately leads to death.[12] Muscle wasting syndromes such as cachexia and sarcopneia (*Bala Mamsa Kshaya*) are associated with conditions like congestive heart failure (CHF), diabetes (*Madhumeha*), chronic obstructive pulmonary disease (COPD), cancer, and chronic kidney disease (CKD). Cachexia is characterized by loss of muscle mass (*Mamsa Kshaya*), fat mass and anorexia. Cachexia is seen in various chronic diseases (*Deergha Roga*), chronic infections and inflammatory diseases including AIDS (*Paretam Tasya Jeevitam*). Cachexia is usually reported as a complication of chronic diseases (*Deergha Roga*), rheumatoid arthritis, chronic hepatitis & cirrhosis (*Udara*) and diabetes mellitus (*Madhumeha*). Independent of the individual chronic disease (such as *Apasmara*, *Kshaya*, *Kushta*, *Raktapitta*, *Udara*, *Gulma*, *Madhumeha*

and other *Deergha Roga*), the wasting process (*Bala Mamsa Kshaya*) follows a common final metabolic pattern. Weakening of voice (*Swara Haani*) is one among the various potential signs and symptoms that are commonly seen in last days of life (*Paretam Tasya Jeevitam*).[12] The present verse may denote various conditions such as cachexia, sarcopenia, anorexia, malnutrition and hypercatabolism etc.

'Hrudayam dahyate yasya -- paretam tasya jeevitam' (Verse 10)[3]

According to verse 10, the person who has been suffering with severe and frequent (*Abheekshnam*) heartburn (*Hrudayam Dahyate*) along with abdominal pain (*Kukshi Shula*) and hoarseness of voice (*Swara Kshaya*) will die soon (*Paretam Tasya Jeevitam*).[3] The present verse indicates GERD and its complications. Heartburn (*Hrudayam Dahyate*) and acid regurgitation are the most common symptoms of GERD. Patients generally report a burning sensation (*Dahyate*) in the retrosternal area and chest (*Hrudaya*?). Chronic and frequent heartburn (*Abheekshnam*) can also be seen in GERD. Patients with GERD may also complain of abdominal pain (*Kukshi Shula*) or discomfort. Chronic laryngitis (*Swara Kshaya*), dysphagia, erosive esophagitis, and esophageal adenocarcinoma (*Paretam Tasya Jeevitam*) are the complications of GERD.[48] Potentially serious esophageal complications (stricture or obstruction or cancer and Barrett's esophagus), extra-esophageal diseases and increased mortality (*Paretam Tasya Jeevitam*) can be seen in GERD patients.[49]

'Amsaabhitaapa jantunaam -- paretam tasya jeevitam' (Verse 11)[3]

According to verse 11, the person who has been suffering with burning type of pain at shoulder (*Amsaabhitaapa*), abdominal pain (*Koshta Shula*), hiccups (*Hikka*) and vomiting (*Chhardi*) will die soon (*Paretam Tasya Jeevitam*). .[3] The present verse may denote various fatal visceral conditions causing referred pain to the shoulder. The word *Amsaabhitaapa* may denote referred pain to the shoulder due to diaphragmatic irritation by visceral causes. *Hikka* in the present verse also may denote intractable and persistent hiccups caused by diaphragmatic irritation by visceral lesions.

Various visceral organs like (lungs, esophagus, liver, stomach, gall bladder and pancreas) through their contact with diaphragm can cause referred pain to the shoulder (*Amsaabhitaapa*). Shoulder pain (*Amsaabhitaapa*) may be increased or reproduced in cases with diaphragmatic irritation by deep breathing, sneezing and coughing. Shoulder pain can be seen in various conditions such as pancoast's tumor, aortic aneurysms, pericarditis, liver cancer or metastasis, pancreatic cancer or abscess, pancreatitis, gall bladder cancer, cholecystitis, cholelithiasis, gastric carcinoma, gastric ulcer, gastritis, and esophageal cancer (*Paretam Tasya Jeevitam*). In liver cancer, the referred pain can be felt at the top or posterior part of the right shoulder (*Amsaabhitaapa*) along with other symptoms such as nausea, vomiting (*Chhardi*), and poorly localized upper abdominal pain (*Koshta Shula*). In pancreatic cancer, shoulder pain is usually referred to the left scapula and / or supraspinous area (*Amsaabhitaapa*). Nausea and vomiting (*Chhardi*) along with other symptoms can be seen in pancreatitis, pancreatic abscess and cancer. Pain in the posterior part of the right shoulder (*Amsaabhitaapa*) can be seen in gallbladder involvement (cholecystitis, cholelithiasis and gall bladder cancer). Pain in the suprascapular region (*Amsaabhitaapa*) can be seen in gastric cancer or ulcer or gastritis. Metastatic tumours that invade abdominal and pelvic viscera are the most common causes of pain in cancer patients (*Paretam Tasya Jeevitam*).[50]

Persistent and intractable hiccups (*Hikka*) can be seen in mediastinal diseases, mediastinal lymphadenopathy, myocardial infarction, diaphragmatic tumours, esophageal tumours, GERD, stomach volvulus, *H. Pylori* infection, gynaecological tumours, cancers and metastatic lesions (*Paretam Tasya Jeevitam*). A tumour infiltration on the diaphragm is the most common cause of intractable hiccup (*Hikka*). Hiccup can also be a symptom of esophageal cancer and stomach volvulus (*Paretam Tasya Jeevitam*).[51] The present verse may denote various visceral emergency conditions which induce diaphragmatic irritation, referred pain at the shoulder and associated with high mortality.

'Vaapitam jwalitam martya -- durlabham tasya jeevitam' (Verse 12)[3]

According to verse 12, the person who perceives cold objects (*Vaapitam*) as hot or burning (*Jwalitam*), water (*Salilam*) as hot or burning (*Hutaashanam*) and perceives sun (*Bhaskaram*) as moon (*Soma*) will die soon (*Durlabham Tasya Jeevitam*). .[3] *Vaapitam Jwalitam Martya Salilam Hi Hutaashanam* may denote a condition of paradoxical heat (PH) or paradoxical burning sensation whereas *Bhaskaram Manyate Somam* may denote scieropia. PH is an illusion of skin heat (*Jwalitam / Hutaashanam Iva Manyate*) seen in many neurological conditions. It has been postulated that activation of right insular cortex may induce a perception of heat sensation (*Jwalitam / Hutaashanam Iva Manyate*) though the skin temperature is cool (*Vaapitam / Salilam*). PH is characterized by perception of heat when the actual skin temperature is either cool or neutral (*Vaapitam Jwalitam Martya Salilam Hi Hutaashanam*). PH can also accompany frostbite, fibromyalgia, multiple sclerosis, and neuropathic pain. A cold stimulus can be perceived as hot (*Vaapitam Jwalitam Martya Salilam Hi Hutaashanam*) when A-fiber is blocked. Patients with compromised myelinated function and / or central abnormalities experience PH sensations.[52] Patients with paradoxical burning sensation complain that a snow ball held (similar to *Vaapitam / Salilam*) in the bare hands burns (*Jwalitam / Hutaashanam*); Paradoxical burning sensation can be seen in central post-stroke pain (CPSP).[53] Multiple sclerosis patients frequently perceive heat (*Jwalitam / Hutaashanam*) instead of cold (*Vaapitam / Salilam*) when their skin was cooled (paradoxical heat sensation) (*Jwalitam / Hutaashanam Iva Manyate*). Paradoxical heat sensation is seen in uremic polyneuropathy, blockage of myelinated afferents by pressure or ischaemia and in the conditions of central demyelination.[54] Scieropia refers to darkening of vision (bright objects perceived as dim or less bright such as *Bhaskaram Manyate Somam*) which occurs due to diffuse occipital damage (patient perceives everything as dim and at twilight). Patients having achromatopsia complain that everything appears in shades of gray, less bright or tinged a dirty gray (*Bhaskaram Manyate Somam*). Achromatopsic patients often have shown abnormal discrimination of hues and saturation. In scieropia, the perception of objects lacks their usual brightness (*Bhaskaram Manyate Somam*) and appears to be in a shadow.[7]

'Yashchaapi vimale surye -- paretam tasya jeevitam' (Verse 13) [3]

According to verse 13, the patient perceiving (*Pashyati*) clear sky or clear sunny day (*Vimale Surye*) as cloudy (*Meghaan*) and cloudy / rainy day (*Durdinam*) as clear sunny day (*Sudinam*) will die soon (*Paretam Tasya Jeevitam*).[3] Glaucoma patients used to describe the

change in their vision as 'fuzzy' or 'less clear' or 'difficult to read' or 'hazy' or 'cloudy' (*Meghaan Pashyati Sarvasha*). Blurriness or dimness or cloudiness (*Meghaan Pashyati Sarvasha*) can be seen in glaucoma patients.[55] *Durdinam Chaapi Pashyati Sudinam* (perceiving cloudy or rainy day as clear sunny day) may denote visual hallucinations or visual illusions or visual perceptual distortions (VPDs). Visual hallucinations (*Durdinam Sudinam Iva Pashyati*) are seen in Creutzfeldt-Jakob disease (CJD), Delirium, Charles Bonnet Syndrome (CBS), Parkinson's disease (PD), dementia, epilepsy, migraine, and psychiatric disorders. Visual hallucinations may be simple (flashes of light or geometrical figures etc) or elaborative (flock of angels etc). .[7] The present verse may denote various ophthalmological and neurological conditions associated with high mortality.

'Yam rasa naavatishtate -- na cha jeevati taadrusha' (*Verse* 14)[3]

According to verse 14, the patient who has been suffering with deprivation of *Rasa Dhatu* (nutritional deterioration at end of life), decreased medication absorption (*Bheshajam Naavatishtate*), increased side-effects of medication (*Bheshajam Vipareetaani*), functional decline of sensory organs (*Indriyaani Naavatishtate*) and perceptual abnormalities (*Indriyaani Vipareetaani*) may denote an imminent death.[3] Providing good nutrition to terminally ill patients (*Na Jeevati*) is of no use or futile (*Rasa Naavatishtati*) in terms of reducing morbidity or mortality (*Na Jeevati*). Force-feeding will not reverse the underlying disease process (*Rasa Naavatishtati*) in terminally ill patients. Body takes what it needs during end-of-life stages and loss of interest in food is natural at that time.[56] Malnutrition (*Rasa Naavatishtati*), sarcopenia and cachexia are known to influence the morbidity and mortality in cancer patients. Malnutrition (*Rasa Naavatishtati*) promotes anorexia and weight loss.[57] Many patients who are terminal (*Na Jeevati*) generally experience weight loss, loss of energy and loss of appetite (*Rasa Naavatishtati*).[58] *Rasa Naavatishtati* may denote malnutrition, loss of appetite, anorexia, weight loss, cachexia and nutritional deterioration commonly found in patients with terminal illnesses.

Important pharmacokinetic and pharmacodynamic changes occur with advancing age (*Na Jeevati*). Pharmacokinetic changes include a reduction (*Bheshajam Naavatishtate*) in hepatic and renal clearance and prolongation of elimination half-life of drugs (*Bheshajam Vipareetaani*) whereas pharmacodynamic changes involve altered (usually increased) sensitivity (*Bheshajam Vipareetaani*) to several classes of drugs. Age-related changes (*Na Jeevati*?) in pharmacodynamics (the effect of a drug on its target site) and pharmacokinetics (drug absorption, distribution, metabolism, and excretion).[59] Various factors may influence (*Bheshajam Vipareetaani*) the drug absorption.[60] Decreased or increased (*Bheshajam Vipareetaani*) blood concentrations of a drug, altered efficacy (*Bheshajam Vipareetaani*) or increased risk of adverse drug reactions (*Bheshajam Vipareetaani*) due to the changes in the drug pharmacokinetics. Changes in pharmacokinetic parameters (*Bheshajam Vipareetaani*) can be seen in the patients receiving palliative care (*Na Jeevati*). Decreased intake of fluids, catabolic states, inflammation, and cachexia occur at the end of life (*Na Jeevati*), and alters pharmacokinetics (*Bheshajam Naavatishtati* & *Vipareetaani*).[61]

Indriyaani Naavatishtate may denote sensory decline or deficit or impairment whereas *Indriyaani Vipareetaani* may denote abnormal sensory perception, hallucinations & illusions etc. These conditions are commonly seen in dementia, delirium and various other terminal illnesses. Sensory functions declines (*Indriyaani Naavatishtate*) as person ages. Decline or sensory deficits (*Indriyaani Naavatishtate*) such as decreased visual acuity, changes in lens elasticity, presbyopia, reduced hearing sensitivity, difficulty to understand speech in a noisy environment, slow central processing of auditory stimuli, disturbed sound localization, deficits in smell and taste, and decline in vibrotactile sensitivity are frequently found in older people. Impaired sensory functioning (*Indriyaani Naavatishtate*) impacts the quality of life and even somatic health.[62] Age-related neuropathological changes in the olfactory, auditory, visual, and motor systems along with cognitive symptoms may denote Alzheimer's disease (AD).[63] Sensory and cognitive impairments (*Indriyaani Naavatishtate*), impaired activities of daily living (ADL), cognition, behaviour, visuo-spatial skills, mobility, overall quality of life, higher rates of depression, and institutionalization can be seen in AD and other dementias.[64] Sensory deprivation (*Indriyaani Naavatishtate*) or sensory impairment (*Indriyaani Vipareetaani*) is a risk factor for delirium.[65] Causes of late life psychosis (*Indriyaani Vipareetaani Na Jeevati*) are dementia syndromes with psychosis, delirium, and psychiatric disorders. Dementia is the most common risk factor of psychotic symptoms (*Indriyaani Vipareetaani*) in geriatric population (*Na Jeevati*).[66]

'Vaanaspatya phalam moolam -- na cha jeevati taadrusha' (*Verse* 15)[3]

According to verse 15, the patient (*Roga Sprushtasya*) who is not getting any relief by medicines prepared with different types of herbs (*Vaanaspatya*), fruits (*Phalam*) and roots (*Moolam*) and also not getting benefit (*Na Drushyate*) by standard treatment (*Bhaishjyaartham*), he will die (*Na Jeevati*). .[3] The WHO defines palliative care as 'the active care of patients whose disease is unresponsive (*Na Drushyate*) to curative treatment protocol (*Bhaishajyaartham*)'. Death is inevitable (*Na Jeevati*) despite aggressive treatment (*Bhaishjyaartham*) for various diseases.[67] The present verse denote various terms such as treatment futility, inappropriate and non-beneficial treatment (NBT) (*Na Drushyate*) especially given at the end of life (EOL) (*Na Jeevati*). Treatment futility is a subjective perception of lack of treatment benefit. NBT indicates a treatment that is implemented with little / no hope of any beneficial effect (*Na Drushyate*), due to poor health of the patient (*Roga Sprushtasya*) and poor prognosis (*Na Jeevati*).[68] The above verse may denote NBT seen at EOL.

'Ityetaani bhishag drushtva -- yashomaargapratikshayaa' (*Verse* 16)[3]

According to verse 16, the physician (*Bhishak*) should not attempt to treat (*Na Chikitsaam Prayunjeeta*) the patients who are suffering with various *Arishta Lakshanas* (fatal signs & symptoms) (*Ityetaani Lakshanaani Mumurshataam*) explained in the previous verses.[3] Various *Arishta Lakshanas* mentioned in this chapter may denote death and attempting to treat them may cause defame (*Yashomaargapratikshaya*) to the concerned physician, hence treating such type of patients (having above said *Arishta Lakshanas*) should be avoided. Attempting to treat the patients who have been suffering with terminal illness and at EOL stages may generate false hope in patients mind, causes excessive burden on limited healthcare resources, staff dissatisfaction with expected poor prognosis and improper diversion of the available resources.[68] ICU (intensive care unit) patients may die (*Ityetaani Lakshanaani Mumurshataam*) no matter what treatment (*Na Drushyate Bheshajam*) is given to them.[69] *Maharshi Bhela* has

clearly mentioned that, physician should not attempt to treat terminal illnesses or the patients who are at EOL stages.

Limitations & future research directions

The main disadvantage of exploratory research is that they provide qualitative data and interpretation of such information can be biased and judgmental. The present work has merely explored the contents of YSY of BSIS with varying levels of depth. It is a well-known fact that exploratory research is the initial research, which forms the basis of more conclusive research. *Maharshi Bhela* has provided a list of fatal signs & symptoms that are having clinical and prognostic significance and are useful for physicians in clinical decision making process especially for the patients who are suffering with terminal illness or at EOL stages. *Ayurvedic* prognostic models can be developed and used in prognostic decision making based on the content of the YSY chapter of BSIS.

Conclusion

'*Yasya shyaaveeyam'* is the fifth chapter of '*Indriya sthana*' of '*Bhela samhita*' which contains 16 verses dealing with fatal signs and symptoms seen at terminal stages of illness. Most of the verses are unique and not found in other classical *Ayurvedic* texts. Various conditions such as WD, IgA vasculitis, HSP, Allergic purpura, consequences of increased IAP and intra-thoracic pressure, abdominal and pelvic malignancies, ACS, DIC, Chorea, auto-immune chorea, Neuroacanthocytosis, Polycythemia with chorea, Simmond's disease, Pituitary cachexia, Erythromelalgia, RES, RSS, AMI, GERD, NCCP, Cachexia, Sarcopenia, Malnutrition, Hyper catabolism syndromes, Acute abdomen, upper gastrointestinal carcinomas, paradoxical heat sensations, Scieropia, Glaucoma, Achromatopsia, Organic brain diseases, pharmacokinetic and pharmacodynamic alterations of drug actions in terminal illnesses, sensory deficits and abnormal perceptions, dementia, delirium, and NBT at EOL stages are documented in this chapter by '*Maharshi Bhela*'. Present study paves the path for future research works in *Ayurvedic* prognostic science.

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Conflicts of interest

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