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# Swastyayanam of Bhela Indriya Sthana - an explorative study

## Abstract

Maharshi Bhela has composed an Ayurvedic treatise called Bhela Samhita. Swastyayanam Indriyam is the second chapter of Bhela Indriya Sthana. The present work is aimed to explore the contents of Swastyayanam Indriyam of Bhela Indriya Sthana. Swastyayanam Indriyam deals with the assessment of general health based on some characteristic physical parameters. Various concepts such as estimating cardio-vascular health based on the colour of eyes, face, palms and soles; estimating immune competence of an individual based on scalp health and quantity of sebum secretion, estimating general health or aging based on the condition of hair follicles, estimating general health based on oral health; predicting chronological age based on biophysical characteristic features of facial aging and facial shape, excluding dementia and delirium like conditions based on the presence of incoherent speech, excluding movement and neurodegenerative disorders by excluding various abnormal involuntary body movements, estimating inhibitory control based on features like disinhibition or inappropriate sexual behaviour, estimating general and respiratory health based on the position of umbilicus absence of breathing difficulties at night, estimating general health based on the nail colour, lustre and smoothness etc are documented in this chapter by Maharshi Bhela. Maharshi Bhela has provided clinical examination methods which are inexpensive, simple, non-invasive, convenient and suitable for low or middle income countries for estimating general health or condition of specific organ or body systems. Though further research is still required to substantiate the claims made in this chapter, the present study paves the path for future research directions.

**Keywords:** aging, bhela indriya sthana, bhela samhita, charaka indriya sthana, indriya sthana, oral health

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## Introduction

Maharshi Bhela was the colleague of Maharshi Agnivesha (author of most popular Ayurvedic text Charaka Samhita) and one among the six disciples of Acharya Punarvasu Atreya. Maharshi Bhela has composed an Ayurvedic treatise called Bhela Samhita, based on the teachings of his preceptor Acharya Punarvasu Atreya.[1] Recently the Literary Research Unit at Tanjavur under CCRIMH (Central Council for Research in Indian Medicine and Homoeopathy) has brought out a critical edition of Bhela Samhita after in-depth study of the manuscript.[2] Bhela Samhita belongs to Samhita period of Ayurveda (post vedic period 100 BC to 400 BC). Bhela Samhita was available in its original form till recent years as it was not exposed to the redactors and commentators. Maharshi Bhela was quoted by many authors and commentators of the medieval period. Bhela Samhita is one among the unique ancient classic of Ayurveda, which has been modestly explored. Maharshi Bhela has given a lot of and notable contributions to Ayurveda.[3]

Bhela Samhita consists of 120 chapters divided among 8 sections. Indriya Sthana is one among the eight sections of Bhela Samhita and it comprises of 12 chapters. Bhela Indriya Sthana deals with prognostic aspects and it contains the description of various Arishta Lakshanas which denotes imminent death. Physician should be alert in detecting those Arishta Lakshanas in patients and avoid treating such type of patients. Along with Arishta Lakshanas, Bhela Indriya Sthana has also described various parameters to evaluate the health and/or quality of life objectively. Swastyayanam is the second chapter of Bhela Indriya Sthana which contains the description of various parameters which are intended to evaluate or measure health/wellness/quality of life. The concepts mentioned in this chapter are unique and different from other Ayurvedic classical texts.[4] Previous works have established that, various conditions mentioned in Charaka Indriya Sthana,[5–18] Bhela Indriya Sthana,[19–26] and Kashyapa Indriya Sthana.[27] have prognostic potential and clinical applicability in present era also. The present work is aimed to explore the contents of Swastyayanam Indriyam of Bhela Indriya Sthana.

## Review methodology

Ayurvedic literature regarding Bhela Indriya sthana, Charaka Indriya Sthana, Kashyapa Indriya Sthana and also relevant references from other classical Ayurvedic texts has been collected. Relevant Ayurvedic books searched from the institutional library where the present work has been carried out. Electronic databases such as Google scholar, PubMed, Scopus etc. have been searched to find out the relevant articles published till December 2021, irrespective of their date of appearance or publication year. Relevant Ayurvedic and contemporary medicine related key words have been used for searching databases. Abstracts, full text articles and book chapters published in English language were only included in the present work. No filters have been used while searching databases.

## Discussion

Each verse of Swastyayanam Indriyam has been explored in the following sections with special emphasis on its meaning, prognostic importance and similarity with contemporary medical conditions or diseases (Table 1).

### 'Mukham netre shariram cha -- bhavishyati' (Verse 1)

As per the above verse, 'whose face (Mukham), eyes (Netram), body (Shariram), palms (Paani) and soles (Paada) are endowed with

blood and looks red in colour denote healthiness'.[4] Skin redness is caused by skin vasodilation and vascularisation has connections to physiological status including health. Blood oxygenation state is related to health status which affects skin colour. Increased blood oxygenation is associated with increased aerobic fitness, physical fitness and health. This is consistent with the established relationship between skin blood perfusion and physiological status. Humans are sensitive to the subtle colour difference between oxygenated and deoxygenated blood (oxygenated blood is a bright red colour and deoxygenated blood has a slightly bluish red colour), and interpret this difference in skin blood oxygenation colour as a cue to the health status of individuals. Studies have shown that skin colour distribution affects the appearance of health, age and attractiveness in human faces.[28]

The vasculature of the eye and the heart share several common characteristics. The heart and the eye, two organs at first sight not linked to each other but they do have more in common. The eye, with its easily accessible vasculature, may indeed be a window to the heart.[29] The human conjunctiva is a highly vascularized transparent tissue that is readily accessible for examination. The ease of accessibility of the conjunctiva microcirculation can serve as a window to the body, ideal for evaluation of pathologic conditions that affect systemic circulation. Measurements of conjunctiva blood flow in human eyes could be done by using a modified scanning laser ophthalmoscope. With the help of 'slit lamp biomicroscope digital imaging in conjunction with a space time image analysis technique', quantitative measurements of human eye conjunctiva blood vessel diameter, velocity, and flow rate etc could be measured.[30]

A normal palm has coluor a light red colour or a pinkish red with a shiny and smooth texture.[31] Redness of blood and consequently of skin, is a measure of hemoglobin concentration in blood. Recent studies have estimated haemoglobin levels based on redness of palm with the help of a machine which is 'vision based portable', user-friendly, non-invasive and cost effective. Hemoglobin levels can be estimated based on palmar skin colour by using a specialized non-invasive machine.[32] It denotes that palmar skin colour can provide a clue to the oxygentation levels of blood and also haemoglobin levels. Foot skin temperatures were found to have a positive association with blood flow in healthy participants. Skin temperatures taken in the feet of DM (diabetes mellitus) patients could reflect blood flow status in the lower limbs, probably due to a reduction in blood flow which leads to vasoconstriction of the peripheral blood vessels, utltimately causing a decrease in skin temperature. The infrared thermography is a simple, inexpensive, fast, non-invasive and indirect method for measuring the foot-skin blood flow.[33] Maharshi Bhela has estimated blood oxygenation, vasculature, regional blood flow rate, haemoglobin levels, and cardio-vascular health of an individual by simple visual inspection of face, eyes, palms, soles and body skin colouration.

## 'Yasya gomayachurnaabham -- kandu samjaayate drudham' (Verse 2)

Appearance of cow dung like powder (Gomaya Churnaabham) over the head (Murdhni) along with excessive sebum (oiliness) (Snihyamaane) and itching (Kandu) denotes pathology and absence of these features denotes health..[4] There are total 8 verses in the current chapter (Swastyayanam Indriyam) (8th verse is incomplete); from 4th to 7th verse, Maharshi Bhela has used the prefix of 'Na' which denotes 'absence of' (a particular pathology) but for verse 2 & 3, the prefix 'Na' is not mentioned (which may be due to grammatical mistake or some other error while translating from original manuscript). To get the exact logical meaning of the verse, 'Na' prefix is required for verse 2 & 3. The present verse could be interpreted as, 'absence of cow dung like powder on the head along with excessive greasiness and itching' denotes health (whereas their presence denotes a fatal pathological condition which cause death within a month according to the references from other Ayurvedic classical texts). In Gomaya Churneeya Adhyaya' (12th chapter) of Charaka Indriya Sthana it has been mentioned that, presence of Gomaya Churna (dandruff) along with excessive sebum (Sa Sneham) denotes imminent death within one month.[16] Hence, similar meaning should be considered in the present context also.

Dandruff (pityriasis sicca) is defined as fine scalp scaling and considered as part of the spectrum of adult SD (seborrheic dermatitis). SD is associated with the increase in cutaneous lipids resulting from sebaceous gland development and sebum secretion. SD is commonly seen in patients with AIDS (acquired immunodeficiency syndrome). SD is caused by over proliferation of the lipophilic fungus *Malassezia*. The much higher percentage of positive cultures of Malassezia species in immunocompromised patients confirms that impaired cellular immunity may facilitate fungal survival on the skin. SD is found in increased sebaceous gland activity, immunodeficiency, neurological and psychiatric conditions, and low ambient temperatures etc conditions.[16] Gomaya Churna (dandruff), Snihyamaana (seborrhoea), and Kandu (itching) of the above verse denote SD or dandruff in an immunocompromised patient and their absence indicates healthy scalp i.e. indirectly immunocompetence. Maharshi Bhela has assessed immunocompetence of an individual by using scalp health as a parameter (absence of dandruff / SD / scalp fungal infections).

## 'Yasya kesha pramuchyante -- sa vai swastho bhavishyati' (Verse 3)

Hail falling (absence of) (Kesha Pramuchyante) along with the loss of hair follicles or hair bulbs (Sheerna Moola) denotes health as per the above verse.[4] This verse should possess the prefix 'Na' (absence of) before Kesha Pramuchyante to get a rational meaning or interpretation. Absence of hair falling denotes healthiness but not its presence. Healthy hair and healthy scalp typically complement each other hence a healthy scalp is needed to give the appearance of healthy hair and vice versa. A healthy scalp is generally defined by a lack of abnormalities or disease.[34] The quantity, quality, and styling of hair define one's gender, age, health, and social status. The scalp is a rich environment for microbes. Oxidative stress is commonly found in various pathological conditions like dandruff, SD, psoriasis, atopic dermatitis, and alopecia. Oxidative stress is the inability of the body to sufficiently counteract sources of oxidative damage (like in normal skin aging).[35]

The hair follicle has a unique ability to regenerate itself throughout the life of the organism.[36] The hair follicle is one of only two structures within the adult body that selectively degenerates and regenerates, making it an intriguing organ to study and use for regenerative medicine.[37] Hair growth occurs in a series of stages, starting with the anagen (or growth) phase followed by catagen (or degradation) phase and finally telogen (or resting) phase. Dysfunction during the telogen or anagen stages leads to hair loss. Excessive shedding of hair due to prolongation of the telogen phase is commonly seen in a condition known as 'telogen effluvium'. Hair loss occurs due to various causes such as seasonality, aging, biologic dysfunctions, vitamin and mineral imbalances, endocrine disorders, immunologic diseases, genetic mutations, bacterial and fungal infections, infestation by parasites, atopic dermatitis and psychogenic factors (stress).[36]

Androgenetic alopecia (AGA) or male pattern baldness is the most common cause of hair loss. Histological study of scalp skin affected

by AGA shows not an absence of hair follicles or a decreased density of hair follicles but, instead, a diminution of follicle size or follicle miniaturization.[8] Cicatritial alopecia or scarring type of alopecia is a form of hair loss associated with destruction of hair follicles due to inflammation or rarely due to malignancy. Affected skin in scarring type of alopecia shows loss of follicular ostia. Lichen planopilaris is a chronic inflammatory disease causes permanent destruction of hair follicles and leads to patchy hair loss on the scalp. Destruction of hair follicles leads to irreversible hair loss in scarring forms of alopecia.[39] The scarring (cicatricial) and atrophizing alopecias are a heterogeneous group of diseases which includes, folliculitis decalvans, folliculitis et perifolliculitis capitis abscedens et suffodiens, chronic discoid lupus erythematosus, lichen planus follicularis (lichen planopilaris), postmenopausal frontal fibrosing alopecia, and Brocq's pseudopelade. Asymptomatic loss of hair follicles can be seen on the body as well.[40] Androgenic alopecia (AA) is caused by miniaturization of hair follicles. Alopecia areata is caused by autoimmune destruction of hair follicles involving cell-based and humoral immunity. Hair loss in AA is understood to occur because of T-lymphocyte-mediated autoimmune attack on hair follicles in anagen phase. Lichen planopilaris (LPP), also known as follicular lichen planus of the scalp, is a cicatricial alopecia that occurs because of autoimmune attack of hair follicles, mediated by cell-based immunity. 'Central centrifugal cicatricial alopecia' (CCCA) or 'Follicular degeneration syndrome' are characterized by scarring hair loss due to inflammatory attack on hair follicles.[41] The word Sheerna Moola is important as it denotes various pathological conditions of hair follicle such as 'miniaturization' or 'inflammation' or 'autoimmune destruction' or 'aging' etc. Maharshi Bhela has predicted or assessed general health based on scalp health / healthy hair.

## 'Naasya dantaa prahrushyanti -- sa vai swastho bhavishyati' (Verse 4)

As per the above verse, absence of hypersensitivity of teeth (Dantaa Prahrushyanti), facial aging or palsy or lack of facial luminance (Mukham Vilupyati) and irrelevant or incoherent speech (Asambaddham Bhashati) denotes health.[4] Maharshi Bhela has estimated or assessed general health based on parameters related to / condition of teeth, face and speech.

## Dantaa prahrushyati

Danta Prahrushyati denotes hypersensitivity of teeth and its absence denotes healthiness. DH (dentin hypersensitivity) is defined as "pain derived from exposed dentin in response to chemical, thermal tactile or osmotic stimuli which cannot be explained as arising from any other dental defect or disease". Improper tooth brushing, gingival recession, large amount of exogenous and endogenous acids in diets, poor oral hygiene, and periodontal diseases leading to root exposure are the major etiological factors for DH.[42] Dentine sensitivity (DS) or DH can develop due to pulpal inflammation and can present as irreversible pulpitis i.e., severe and persistent pain. DH develops in two phases, lesion localization and lesion initiation. Lesion localization occurs by loss of protective covering over the dentin and exposing it to external environment. It includes loss of enamel by attrition, abrasion, erosion or abfraction. Gingival recession due to secondary to periodontal diseases is another cause for DH.[43] Gingival recession is reported as being positively associated with some patients suffering from horizontal bone loss due to osteoporosis and also in persons with low standards of oral hygiene.[44] Incidence of DH increases with advancing age.[45]

The relationship between oral health (OH) and general health (GH) has been established by various studies. While the impact and oral manifestations of certain systemic conditions have been identified earlier, later research examined the potential impact of oral diseases on chronic systemic conditions. Periodontal diseases have been linked to cardiovascular diseases, high blood pressure, diabetes, stroke, respiratory diseases, dementia and mortality, where an inflammatory pathway was depicted..[46] Recent research has indicated positive associations between chronic oral infections and diabetes, heart & lung disease, stroke, and low birth weight or premature births. OH reflects the health of the entire body..[47] OH is associated with physical, mental, and social well-being. A careful assessment of disability and impairment of OH should be included in geriatric assessments in order to define the health care plan. The percentages of close prediction for GH (general health) indicators from OH indicators are high (around 80% for all GH indicators). Having a poor OH status is predictive of a poor GH status..[48]

## Mukham vilupyati

Mukham Vilupyati denotes various meaning or conditions such as facial atrophy, palsy, lack of luminance, dryness / dehydration and aging. Facial aging or lack of facial luminance seems to be the most suitable correlation according to the context. Chronological age seems to have potential impact on biophysical characteristics of facial skin. Facial skin ageing is caused by various intrinsic and extrinsic mechanisms. Intrinsic ageing is related to chronological age. Age related facial skin changes can be measured using clinical and biophysical methods. Face is exposed to numerous environmental factors during the whole life course and repeated facial expressions aggravate the formation of wrinkles. The appearance of the facial skin is most important for the perceived age and it has been found that higher skin ageing, wrinkle, and sagging scores in the aged people. The analysis of the skin colour revealed a significant reduction of facial skin luminance. An increase in skin extensibility with age has been found which may be due to loss of elastic fibres and changes in the extracellular matrix during skin ageing. Aged facial skin showed reduced elastic recovery. Chronological age as surrogate marker for intrinsic ageing has potential influence on most facial skin ageing signs. Changes in facial skin elasticity, wrinkling, sagging, and yellowness seem to be caused by additional extrinsic ageing..[49] Dry mouth or xerostomia is a commonly reported condition among older adults. Dry mouth can have negative consequences for quality of life.[50]

Facial shape continued to change throughout life. The characteristic changes in the aging facial skeleton are posterior displacement of the maxilla, lateral inferior shifting of the lateral and inferior orbital rim, creating a larger orbital aperture, and shrinking of the mandible. These skeletal changes are associated with overlying soft tissue changes such as fat atrophy and volume loss. Facial aging is associated with features like facial bony resorption and remodelling, soft-tissue atrophy, laxity, tear trough deformity, malar bags, and jowling. Morphological changes to the facial skeletal framework, soft tissue, ligaments, fat compartments, and skin all contribute to facial aging in variable degrees depending on the extrinsic and intrinsic factors.[51] Maharshi Bhela has established the characteristic features of facial aging thousands of years ago accurately and documented in the above verse.

## Asambaddham bhashati

Asambaddham Bhashati denotes incoherent or irrelevant speech commonly seen in dementia and delirium and absence of it denote healthiness. Delirium is a severe neuropsychiatric syndrome characterized by acute disturbances in attentional functioning, cognitive deficits and neuropsychiatric symptoms. Language

dysfunction is included within the DSM-5 (Diagnostic and statistical manual of mental disorders - 5th edition) criteria for delirium. Production of spontaneous speech, word quantity, speech content and verbal and written language comprehension are impaired in delirious patients. Patients with delirium produced significantly less fluent speech.[52] Disorganized or incoherent speech such as rambling or irrelevant conversation or unclear or illogical flow of ideas or unpredictable switching between subjects has been found in delirious patients.[53] Dementia is characterized by memory and learning difficulties, speech and language difficulties, disorientation in time and space, difficulties in understanding and behavioural changes. Language difficulties are commonly seen in people with dementia and may be a symptom indicating dementia. People with dementia have shown problems of finding words (anomia), lack of understanding of the sentence, and lack of cohesion in discourse. Communicative (speech and language) difficulties seen in dementia should be recognized as a consequence of neural degradation in order to provide the necessary help in time.[54] Maharshi Bhela has predicted neural degradation or neurodegenerative conditions like dementia and delirium at early stages based on incoherent or irrelevant speech.

## 'Na vikshipati gaatraani -- sa vai swastho bhavishyati' (Verse 5)

As per the above verse, absence of abnormal involuntary movements of the body (Vikshipati Gaatraani), change in voice (Swaro Vivartate), and disinhibition (Na Goohate Guhyam) denotes health.[4] References pertaining to various conditions such as abnormal involuntary movements, pathological conditions leads to change of voice and personality deterioration associated with disinhibition are mentioned in Charaka Indriya Sthana.[5–18]

## Vikshipati gaatraani

References pertaining to various conditions such as epilepsy, temporal lobe epilepsy (TLE), status epilepticus, generalized tonic-clonic seizures (GTCS), cortical myoclonus, movement disorders, hyperactive subtype of delirium, restless legs syndrome (RLS), psychogenic movement disorders, versive seizures, spinal cord injury, cervical dystonia, Parkinson's disease (PD), atypical parkinsonian syndromes, tetanus and other neurological and neuromuscular conditions etc are available in Charaka Indriya Sthana.[17] The word Vikshipati Gaatraani denotes abnormal involuntary movements such as tremors, tics, myoclonic jerks, athetosis, dystonia, hemiballismus, chorea, stereotypies, akathisia and various other hyperkinetic movement disorders. Absence of such abnormal involuntary movements of the body indicates general health.

Hyperkinetic movements are excessive or unwanted or involuntary movements seen in various neurologic disorders. Hyperkinetic movements in children are associated with dysfunction of the basal ganglia, cerebellum, cerebral cortex, and other motor pathways. Such movements are important features of various congenital, acquired, and degenerative diseases. Hyperkinetic movements are the motor abnormalities associated with the concept of "extrapyramidal" movement disorders in adults. Various abnormal involuntary movements such as dystonia (one or more repeated postures), chorea (multiple repeated but not rhythmic movements), athetosis (non-rhythmic movements without intervening postures), myoclonus (repetitive and possibly rhythmic brief asymmetric shock-like movements), tremor (rhythmic symmetric movements without intervening postures), tics (multiple, repetitive, non-rhythmic movements with intervening postures), and stereotypies (intervals of rhythmic movements without intervening postures) etc comes under the group of 'hyperkinetic movements'.[55] Several clinical conditions are characterized by the presence of excessive involuntary movements and they are grouped as 'hyperkinetic movement disorders'. Many of these disorders can be explained by disturbances in the basal ganglia. The basal ganglia encompass the striatum (caudate nucleus & putamen), globus pallidus, subthalamic nucleus, and substantia nigra. This "extrapyramidal" system constitutes a number of interrelated circuits from which output emerges at different levels.[56] Maharshi Bhela has opined that absence of various hyperkinetic movements should be considered as a biomarker or parameter of health.

## Swaro vivartate

Voice disorders or dysphonia are characterized by, 'roughness or hoarsenes' (lack of clear vocal quality) (Kshaama), 'breathiness' (excessive air escape during phonation) (Gadgada), 'strain' (perception of excessive vocal effort or hyperfunction) (Deena/Anukeerna), 'consistent hard glottal attacks', 'aphonia' (intermittent or consistent absence of voicing) (Avyakta), 'pitch' (too high or too low) (Grasta), 'loudness' (too loud or too soft) (Kala) and 'variability' (excessive or reduced or monotonous variation in pitch and loudness) etc pathological features. Various Vikrua Swaras' mentioned in Charaka Indriya Sthana denotes different underlying pathological conditions. Voice disorders are the most common speech and language disorders. Various etiological factors like organic (vocal cord malformations, inflammatory, traumatic, infectious, and neoplastic), neurological, and functional causes leads to the development of dysphonia and hoarseness of voice. Various conditions such as vocal cord polyps & nodules, acute corditis vocalis, acute epiglottitis, recurrent nerve paralysis, Reinke's edema, sulcus vocalis, laryngeal granuloma, vocal cord atrophy, functional aphonia, spasmodic dysphonia, laryngeal cancer, dysphonia plicae ventricularis, hypotonic & mutational voice disorders, and essential tremors etc may manifest with changes in voice.[5] Sudden or abrupt change of voice represents inauspiciousness and also imminent death. Transient speech disturbance is a symptom of TIA (transient ischemic attack); motor or speech disturbances can be seen in 'Migraine Aura'; recurrent stereotyped episodes of slurred speech are seen in 'Multiple sclerosis'; 'flaccid' and 'nasal' LMN (lower motor neuron) quality of speech is seen in MG (myasthenia gravis) and 'strangled' speech quality can be seen in ALS (amyotrophic lateral sclerosis). Patients with UVCP (unilateral vocal cord palsy) (may be due to metastatic lung, laryngeal, thyroid and central nervous system cancers) will present with a sudden onset of dysphonia. Dysphonia in immunosuppressed patient indicates chronic lymphoproliferation.[5] Hence change in voice (Swaro Vivartate) denotes various underlying pathological conditions. Maharshi Bhela has used 'voice analysis' to rule out various fatal pathological conditions and also to denote general health.

## Goohate guhyam

The word Goohate Guhyam denotes inhibitory control or covering genitals with clothes. The absence of (Na Goohate Guhyam) indicates disinhibition or inappropriate sexual behaviour (ISB) or hypersexual behaviour or compulsive or disinhibited sexual behaviour. This is the unique finding quoted by Maharshi Bhela which is not available in other Ayurvedic texts. Maharshi Bhela has considered inhibitory control is one of the potential parameter to denote general health. The importance of the inhibitory qualities of behaviour is further emphasized by religious, moral, social, and legal regulatory codes, which typically penalize lack of self-control, often manifesting as inappropriate behaviours. Effective self-regulatory control constitutes a potential neuro-developmental marker of well-being. It has been found that people who were able to better control their actions in

early life were found to have improved psychosocial functioning, resilience, coping with stressors, sense of self-worth and higher degree of education as adults. Non-obscene socially inappropriate behaviours were found in TS (Tourette's syndrome) obsessive-compulsive behaviours, ADHD (Attention-deficit/hyperactivity disorder), mental coprolalia, and poor quality of life. Inappropriate sexual behaviours range from inappropriate talks and jokes about sex, over to exhibitionism and paraphilic behaviours.[57] Compulsive sexual behavior can be divided into paraphilic and non-paraphilic subtypes. Paraphilic behaviours refer to exhibitionism, voyeurism, pedophilia, sexual masochism, sexual sadism, transvestic fetishism, fetishism, and frotterurism.[58]

ISB also known as sexually disinhibited behavior or hypersexuality has been consistently found in most dementia syndromes. ISB includes inappropriate behaviours such as exposing breasts or genitals in public. Acts like public undressing or genital touching may be misinterpreted as sexual, when in fact they can result from pain, hyperthermia, discomfort, or attempts to be freed from a restrained environment. ISB can manifest due to the dysfunction of the frontal lobes (as in dementia), bilateral lesions of the temporal regions (as in Klüver-Bucy syndrome), after temporo-limbic strokes, tumours, epilepsy, involvement of cortico-striatal circuits (as in obsessive-compulsive disorder, Huntington's disease, TS, and Wilson's disease), and right hypothalamus and periventricular area.[59] Disinhibited sexual behaviour has been reported following damage to the frontal lobes, especially the orbitofrontal region of the limbic system. ISB is a by-product of general behavioural disinhibition occurring after frontal lobe damage. Six main regions are identified for ISB like behaviours, including three subcortical (septal region, hypothalamus and ansa lenticularis and pallidus) and three cortical regions (frontal, parietal and temporal lobes).[60] Maharshi Bhela has rightly predicted that having intact inhibitory control (Goohate Guhyam) denotes neurological as well as general health and excludes various neurological syndromes.

## 'Na bhavatyunnato nabhi -- sa vai swastho bhavishyati' (Verse 6)

Absence of everted or displaced or protruding umbilicus, absence of breathing difficulty and sleep disturbance in nights denotes good health.[4] This is also a unique contribution of Maharshi Bhela which is not mentioned by any other authors of classical Ayurvedic texts. Maharshi Bhela has predicted / estimated health based on the position of umbilicus and night time sleep quality. A normal navel is characterized by a round, depressed scar and measures 1.5 to 2cm in diameter. The position of umbilicus is relatively consistent and it typically lies at a vertical level corresponding to the junction between the L3 and L5 vertebrae. The normal position of the umbilicus was about 60% off the way from lower border of the xiphisternum to upper border of the pubis. The umbilicus is located more inferiorly in men compared to women. The umbilicus is placed superiorly in pregnancy and inferiorly in hepatosplenomegaly and ascites. Many abdominal wall deformities and malformations are associated with abnormal umbilical position. In the adult the depressed umbilicus is far more common than the elevated or button-shaped type. Obesity has a tendency to produce the funnel-shaped umbilicus. The ideal umbilicus should have natural contour, prominent depth, minimum additional scars and proper superior hooding.[61] The ideal ratio of the distance from umbilicus to xiphisternum and the distance from umbilicus to pubic symphysis should be 1.6:1. Ideal position of the umbilicus can be calculated based on measurements such as age, height (H), weight, body mass index (BMI), distance between umbilicus and xiphisternum (Xu), distance between pubic symphysis and xiphisternum (Xp) and anterior superior iliac spine (interASIS) distances. The formula to calculate the appropriate anatomical position for umbilicus is, 'Xu= − 0.98 + 0.91Xp − 0.07H'.[62]

## Bhavati unnato nabhi

The protruding or elevated umbilicus (Bhavati Unnato Nabhi) mentioned in the present verse may be due to various conditions such as umbilical hernia (UH), ascites, cirrhosis of liver, hepatosplenomegaly, intra-abdominal tumours and obesity etc. UH occurs due to increased intra-abdominal pressure. Predisposing factors include obesity, multiple pregnancies, ascites, and abdominal tumours. Obesity and excessive weight gain are the potential risk factors for UH. UH in cirrhosis and uncontrolled ascites patients was associated with significant mortality and morbidity.[63] In cirrhotic patients, the prevalence of umbilical hernia is higher.[64] Obesity and higher body mass index (BMI) may be associated with higher recurrence rates in umbilical hernia following complex abdominal wall reconstruction (AWR).[65] Obesity is a risk factor for the development of UH.[66]

## Sukham shwasati ratrau

The word Sukham Shwasati Ratrau denotes comfortable or easy breathing at night or absence of sleep disturbances due to breathing problems at night. Adolescent obesity is associated with significant comorbidities such as sleep-related breathing disorders (SRBD), habitual snoring, obstructive sleep apnea (OSA), upper airway resistance syndrome and hypoventilation. Enlargement of parapharyngeal fat pads, lateral pharyngeal walls, the tongue (including tongue fat), and total upper airway soft tissue are the obesity related anatomic risk factors for OSA.[67] Obstructive sleep apnea syndrome (OSAS) is a common sleep disorder and obesity is a well-known risk factor for OSAS. Middle-aged patients with OSAS were more likely to be obese.[68] Abdominal or generalized obesity have been found associated with risk of incident asthma. Those with obesity and asthma may represent a distinct phenotype that is more severe and harder to control. Asthma symptoms tend to aggravate at night and have been associated with impairments in sleep. Obesity has a direct effect on sleep. Obese patients without sleep apnea are more likely to experience night time sleep disturbances.[69] Based on these evidences, elevated or protruded umbilicus and sleep disturbances can be seen in obesity or overweight patients or in conditions like increased intra-abdominal pressure (ascites, cirrhosis, tumours etc) which may push the diaphragm and cause breathing difficulties especially during nights (supine position). By considering Na Bhavati Unnato Nabhi and Sukham Shwasati Ratrau as potential parameters of health, Maharshi Bhela has excluded various conditions like obesity, OSA, UH, SRBD and conditions which can cause increased intra abdominal pressure.

## 'Na nakha karkashaabhaasa -- sa vai swastho bhavishyati' (Verse 7)

As per the above verse, absence of brittle / rough nails (Karkashaabhaasa), abnormal nail pigmentation (such as brownish or purplish or blackish) (Shyaava), and absence of shining or lustre (Nishprabha) of nails indicates optimum general health.[4] Good looking, attractive, transparent (Prasanna) and shiny (Suprabha) nails are considered as a biomarker or parameter denoting general health by Maharshi Bhela. Purple (Shyaava / Pakwa Jaambava Varna), blue (Neela), and blackish (Krishna) discoloration of nails has been considered as a sign of imminent death in the first chapter (Varna Swareeyam Indriyam) of Charaka Indriya Sthana.[5] Nakheshu Jaayate Pushpam (various nail colour and plate abnormalities) is considered as Arishta Lakshana (fatal sign) in the 12th chapter (Gomaya Churneeyam Indriyam) of Charaka Indriya Sthana.[16] Discoloration of nails (purple

or blue or black) along with atrophy (Veeta Mamsa Sonita & Pakwa Jaambava Varna) is also considered as Arishta Lakshana in the third chapter (Parimarshaneeyam Indriyam) of Charaka Indriya Sthana.[7] Maharshi Bhela's description regarding nail pathology and healthiness in the present verse is slightly different from that of Charaka Samhita. Documentation of Prabha (shining) (denotes health) and Nishprabha (denotes abnormality) of nails is the uniqueness of Bhela Samhita.

### Karkashaabhaasa nakha

The word Karkashaabhaasa Nakha denotes brittle or rough nails. Brittle nail disorder (fragilitas unguium) is characterized by increased fragility and it manifests clinically with varying severity of onychoschizia or onychorrhexis. Onychoschizia is characterized by transverse splitting of the nail plate and in lamellar splitting of the free edge and distal portion of the nail plate due to various exogenous factors, chemicals and cosmetics. Onychorrhexis, manifests as nail plate splitting or ridging, longitudinal thickening, or multiple splits leading to triangular fragments at the free edge. Onychorrhexis occurs due to the abnormalities of vascularization and oxygenation (such as anemia or arteriosclerosis), systemic (metabolic, endocrine etc) and skin diseases..[70] Trachyonychia is a disorder of the nail characterized by rough, longitudinally ridged nails (opaque trachyonychia) or less frequently, uniform, opalescent nails with pits (shiny trachyonychia). The term trachyonychia refers to 'rough nails'. Due to the appearance as nails being rubbed with sandpaper, this condition also referred as 'sandpapered nails'. Majority of cases of trachyonychia are idiopathic and some patients have been associated with various dermatologic and nondermatologic diseases such as alopecia areata / universalis, psoriasis, and lichen planus.[71] Trachyonychia can also be found in diseases such as psoriasis, psoriatic arthritis, SLE (systemic lupus erythematosus), dermatomyositis, syphilis, sarcoidosis, and pemphigus vulgaris.[72]

### Shyava nakha

The word Shyava Nakha denotes abnormal brownish, bluish or blackish pigmentation of nails (melanonychia). A transverse or longitudinal brownish black pigmentation of nail known as 'melanonychia' may be constitutional or due to an underlying melanocytic nevus or malignant melanoma, drugs, hemochromatosis, malnutrition, lichen planus, thyroid disease, smoking, HIV infection, and Addison's disease etc various causes. Cyanosis may manifest as purple or bluish discoloration of the nail bed and digits due to lower oxygen saturation. Central cyanosis is caused by congenital heart diseases, whereas peripheral cyanosis is caused by vasoconstriction and diminished peripheral blood flow caused by cold exposure, shock, congestive cardiac failure, and peripheral vascular disease. Apparent leukonychia with a normal proximal half and abnormal brownish discoloured distal half is known as 'Lindsay nail' seen in patients of chronic kidney disease with uremic renal failure.[72]

### Nishprabha nakha

The word Nishprabha Nakha denotes lack of shining or lustre or radiance or transparency of nails. Loss of lustre can be seen in onychomycosis and chronic paronychia. The commonest change seen in the ageing nail was a pale, dull and lustreless appearance. The colour of the ageing nail varied from yellow to grey with a dull opaque appearance. Senile nail may appear pale, dull and opaque, with colour varying from white or yellow to brown to grey.[73]

### Prasanna suprabha nakha

The word Prasanna Nakha denotes smooth or attractive nail whereas Suprabha Nakha denotes nail with lustre or shining. Healthy nails are shiny, smooth, uniform in consistency on both the surface and free margin views. The visible nail bed is pink, and the free margin is white. A free edge that extends beyond the nail bed, a shiny surface, and a slight curve on the free-margin view are the desirable characteristics of nails.[74] Onychoscopy is one of the best tools for evaluating nail fragility and tendency to break. Onychoscopy allows observation of the nail surface at high magnification. A normal nail plate is shiny and smooth, without longitudinal or transverse creases and grooves.[75] Nails can be considered as windows of systemic diseases and Maharshi Bhela has documented this thousands of years ago in estimating general health and diagnosing underlying diseases. The eight verse of Swastyayanam Indriyam chapter is broken and incomplete hence it is exempted from discussion. Based on the supporting evidences from contemporary medical literature, it seems that the conditions documented by Maharshi Bhela in the current chapter (Table 1), seems to be scientific, rationale but require objectivity and standardization.

**Table 1** Technical terms of *Swastyayanam Indriyam* with their relevant meaning

| Technical terms | Relevant condition/parameter |
|---|---|
| *Sa Raktam Drushyate* (B. I. 2 / 1) | Denotes cardio-vascular health; optimum peripheral circulation; |
| *Gomaya Choornaabham* (B. I. 2 / 2) | Dandruff |
| *Snihyamaane* (B. I. 2 / 2) | Seborrhoea |
| *Sheerna Mula* (B. I. 2 / 3) | Hair follicle |
| *Dantaa Prahrushyanti* (B. I. 2 / 4) | Dentin hypersensitivity |
| *Mukham Vilupyati* (B. I. 2 / 4) | Facial aging; facial palsy; dehydration; |
| *Abaddham Bhashate* (B. I. 2 / 4) | Inappropriate / irrelevant / incoherent speech |
| *Vikshipati Gaatraani* (B. I. 2 / 5) | Abnormal involuntary movements |
| *Swaro Vivartate* (B. I. 2 / 5) | Abnormal voice; voice disorders |
| *Nabhi Yathavastho* (B. I. 2 / 6) | Normal position of umbilicus |
| *Sukham Shwasati Ratrau* (B. I. 2 / 6) | Absence of breathing difficulty at nights |
| *Nakha Karkashaabhaasa* (B. I. 2 / 7) | Brittle nail disorder; Trachyonychia; |
| *Shyava Nakha* (B. I. 2 / 7) | Melanonychia; cyanosis; Lindsay nail; |
| *Nishprabha Nakha* (B. I. 2 / 7) | Dull and opaque nails; |
| *Prasanna & Suprabha Nakha* (B. I. 2 / 7) | Healthy, smooth, transparent and shining nails; |

(B. I. 2 / X): B - *Bhela Samhita*; I - *Indriya Sthana*; 2 - Second chapter; X - *Verse* number

## Conclusion

Swastyayanam Indriyam is the second chapter of Indriya Sthana of Bhela Samhita which deals with assessment of general health based on some characteristic physical parameters. Most of the content is unique (though some similarities have been found with Charaka Samhita) and not explained in any other classical Ayurvedic texts. Various concepts such as estimating cardio-vascular health or peripheral circulation based on the colour of eyes, face, palms and soles; estimating immunocompetence of an individual based on scalp health

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or presence / absence of dandruff and quantity of sebum secretion, estimating general health or aging based on hair falling and condition of hair follicles, estimating general health based on oral health and presence of hypersensitivity of teeth, estimating chronological age by biophysical characteristic features of facial aging and facial shape, excluding dementia and delirium like conditions based on the presence of incoherent speech, excluding movement and neurodegenerative disorders / syndrome by excluding various abnormal involuntary body movements, estimating inhibitory control based on features like disinhibition or inappropriate sexual behaviour, estimating general health based on the position of umbilicus, estimating respiratory and general health based ruling out breathing difficulties at night and conditions like obesity, and estimating general health or hidden systemic diseases based on the nail colour, lustre and smoothness are documented in this chapter by Maharshi Bhela. Maharshi Bhela has provided clinical examination methods (most of them are based on simple visual inspection) which are inexpensive, simple, non-invasive, convenient with moderate accuracy (though they are not free from intra and inter-observer variability and lacking objectivity) and suitable for low or middle income countries for estimating general health or condition of specific organ / body systems as well as to diagnose or rule out hidden diseases. Questionnaire or screening methods can be developed to estimate general health based on the parameters suggested by Maharshi Bhela especially to implement them in rural healthy surveys and to develop health care plans. Though further research is still required to substantiate the claims, the descriptive results of the present study provide fundamental understanding on potential ideas and pave the path for future research directions.

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## Conflicts of interest

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