

A study of Assessment pranavaha srotodushti in TamakShwasa with special reference to spirometry

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Introduction

Ayurveda is the science of intuition & intellectual reasoning, having strength of practical experience for age in india & adjacent borders. It is enriched with the hidden stream of herbal & herbo-mineral components. This science is proved more capable for the solution of both old and new health problems of medical science.

Shwasa is a disease of pranavaha, udakavaha and annavaha srotas. As importance of sequence, pranavaha srotodusti is a major part of samprapti in Shwasa. ¹ All most all the authorities of ayurveda under the heading of Shwasa roga has mentioned the concept of Tamakshwasa. Which is one among the five types of Shwasa. The nomenclature itself indicates that during the period of attack patient feels entering into darkness due to severe dyspnoea . The concept of vata has got a great importance in Indian system of medicine and abnormalities of vata has been considered to be more basic pathogenesis of many disease of our body.

In tamakShwasa due to dust, smoke, use of cold place/thing, heavy exercise, eating dry foods, abhishyandi aahara, jalja & anup mansa causes upward movement of vata in the passage of respiration & increase of kapha leading to aggervation of kapha finally produces many symptoms like ruddha Shwasaa, pinasa, sushk kaas, etc. Now a days etiological factors like smoke, fog, pollen grains, cigarette smoking etc. affects directly the respiratory system causing pranvaha srotodushti. Diseases of pranvaha srotosa are so important that they may prove fatal if ignored. Among the five types of Shwasa vyadhi tamakShwasaa is yapya vyadhi , type of asadhya vyadhi. ²

There is some similarity between the etiological factors & symptoms mentioned by Ayurveda & modern science. Tamak Shwasa is correlated with bronchial asthma ³, which is considered as a chronic inflammatory disorder of the airway.⁴ This chronic inflammation is responsible for decrease in bronchial lumen more during expiration than inspiration causing extremely difficult breathing & increase hyper-responsiveness to a variety of stimuli. Bronchial asthma is still considered as a major global health problem. Recent review stated that it is one of the major causes of morbidity & mortality in all age groups. The physical, psychological & socioeconomic morbidity is also too high after wide range availability of diagnostic profile & beneficial pharmacological agents.

Spirometry is the most common test of the lung function tests. This test looks at how well your lungs work i.e. how well you breathe in & out. Spirometry measures the amount &/or speed of air that can be inhaled & exhaled.

So it helps out to confirm the condition of your lung in any disease. In asthma there is decrease in bronchial diameter due to inflammation, due to which FEV1/FVC is reduced. Therefore reduced

FEV1/FVC directly indicates obstructive pathology of asthma.

Spirometry is an ethical and globally accepted tool for the diagnosis of pathology in the lungs, many of the diseases can be diagnosed with the help of spirometry and also the type of pathogenesis can also be understood. Hence to develop an objective parameter for the assessment of pranavaha srotodusti in tamakShwasaa; this project has been taken up by us.

AIM- Study of assessment of pranvaha srotodushti in TamakShwasa with special reference to Spirometry.

OBJECTIVES-

To study TamakShwasa vyadhi from ayurvediya samhitas & moderntexts.

To understand Pranvaha srotas & its dushti.

To study & elobarate pranvaha srotodushti in TamakShwasa.

To study & understand spirometry.

To analyse significance of spirometry in pranvasrotodushti of TamakShwasa.

Acharya madhav has described the Shwasa roga along with hikka in 12thchapter as —hikka Shwasa nidanam tamaka & pratamaka has been described here same as that of sushruta. No reference of pitta sthana involvement in Shwasa roga is found. But some other etiological factors like raja (dust particle), ajeerna, klinna etc. have been included under pratamak Shwasa. ⁵

Classification

The Shwasa roga is classified on the basis of their clinical features in all the classics, not on the basis of doshik predominant, so the Shwasaa roga can be classified as MahaShwasa, Urdhwa Shwasa, Chhinna Shwasa, Tamaka Shwasa, Kshudra Shwasa. ⁶

This disease is so called because of the fact that the attack of the disease specially precipitate during night and also during the state of attack dyspnoea become so severe that patient feels entering in to the darkness. Both the kapha and vata dosha and prana vayu deranged during this disease. When vayu leaving its normal course takes a reverse course, reaches the respiratory passages (pranvaha srotas), obstructs the neck and head and increases the secretion of kapha, produces coryza, while it get obstructed by that kapha. This obstruction lead to variety of dyspnoea with wheezing sound and painful respiration ⁷. As a result of this acute dyspnoea patient gets fainted, particularly when both the frequency and intensity of cough increases. This distress condition persists until the patient expectorates,

expectoration of sputum give temporary comfort to him. There is discomfort in throat and he can hardly speak in words. Patient cannot stay in lying down posture as the paroxysms increase, vata presses up on both his sides while lying. Patient feels comfort in sitting or propped up posture; hot beverage also give comfort to him. He may have protruded eyes, sweating over forehead, dry mouth, he is very much distressed and the dyspnoea usually get aggravated by cloudy, humid cold weather, foul smelling and kapha increasing food. Warm substances are helpful to him and also produce soothing effect. This condition is palliable but if the origin is recent may be curable⁸. Sushruta described that various associated symptoms like vomiting, aversion to food, rattling sound in the throat are also present during this condition⁹

Pratamaka and santamaka Shwasaa

After dealing with tamak Shwasa, two allied conditions pratamaka and santamaka are mentioned by Charaka. These are known as two types of tamak Shwasa or further complication of the disease proper. Sushruta and Vagbhata only mentioned the name of pratamaka, which includes the clinical manifestation of santamaka.

Pratamaka Shwasaa- in this clinical condition fever and bouts of fainting are the associated symptoms in addition to those of tamak Shwasa¹⁰. Chakrapani Dutta is of the opinion that although kapha and vata are the predominant dosha in tamak Shwasaa, pitta is also equally deranged in pratamaka Shwasa causing fever. The bronchial asthma with secondary infection can also produce such manifestation of pratamaka Shwasaa.

Santamaka Shwasaa- this is to be caused by udavarta (reverse movement of vayu), suppression of urges, indigestion, inhalation of dust. There is a strong psychosomatic component associated with the disease. The attack usually occurs during night and patient feels to be drowning in the sea of darkness. Interestingly attack is relieved by cold substance and measures, which is opposite in nature to tamak Shwasa. Here the tama guna increases and the patient feels sinking in darkness, this leads to the nomenclature of the Santamaka Shwasa¹¹. The patient of bronchial asthma developing cor pulmonale and emphysema or cardiac asthma patient may develop clinical features of santamaka Shwasa.

Nidan

In ayurveda tamak Shwasa is included under 5 types of Shwasaa roga, it is a kapha vata predominant disease. The disease has got a separate entity in ayurveda with its multiple etiology, pathogenesis, symptomatology, etc. Separate emphasis has been laid down in ayurveda regarding the etiological factors and grouped in several ways. The etiological factors classified in the following three groups.^{12,13,14}

Excessive use of cane sugar, flour of rice, tila oil, phaluk, sheetaambu and pinyaka. Vidahi bhojan,

vishtambhi bhojan , amakshira, abhishyandi ahar,guru and kaphaja bhojan Excessive intake of jalaja and anupa mamsa. Dadhi, rukshanna intake in large amount. Vishamashana, adhyashana, samashana. Visha, nishpav,masha, shakula intake All these factors result in to the vitiation of vata and kapha dosha inthe body. The entry of raja (dust) and dhooma (smoke) in the respiratorypassage. Always staying in sheeta sthan and exposed to sheeta vayu. By excessive vyayama, gramya sevena, adhva, bhara vahana, vegavidharana. Marmaghata and trauma on the kantha and urah Pradesh. Excessive performance of vamana and virechana therapy, atipatarpan. All these factors vitiates both vata & kapha dosha.

Samprapti (pathogenesis): Shwasaa means Shwasa kashtata (difficulty in breathing) or Shwasaa krichrata (dyspnoea) in roga vidnyan. Regarding the samprapti, charaka described that already provoked vata by various etiological factors, enter in to the —pranavaha srotas. There it derange the kapha in urah and finally produces obstruction in the pranvaha srotas i.e. obstruction in airflow in and outside ¹⁵. Here in these regards pranvaha srotas indicates respiratory system, but more particularly lungs in this context. The obstruction is due to the vitiation of pranvayu, where there is over secretion of kapha. Other authorities (especially sushrut,Vagbhat) stated that Shwasaa roga is caused by the obstruction in the free flow of vayu inside the pranvaha srotas. In the concept of western medicine bronchial asthma is due to the spasam of bronchial muscle,oedema of mucus membrane and excess mucus secretion in the respiratory tract. Thereis a great similarity between the western and ayurvedic concept regarding it. As the bronchoconstriction can be said as the contribution of pranavayu and mucosal swelling and hypersecretion of mucus are the contribution of vitiated kapha.

The whole pathogenesis of Shwasa roga is clearly described by charaka in three phases.

At the beginning he described the common factors involved inthe pathgenesis of hikka and Shwasa and emphasized vata and kapha are the chief doshas involved in the process, he also concluded that both the disease has its root in the pitta sthana. Chakrapani duttahas mentioned that amashaya being the seat of pitta should be considered to be the place of origin of this pathogenesis. Besides Vagbhat has also mentioned it as Amashaya samudbhava disease,but amashaya is also consider as the seat of both kapha and pitta, to clear the concept further worker developed the concept urdhva amashaya is place for kapha and adho amashaya is place of pitta, and in Shwasa roga adho amashaya is involved. Although Shwasa roga is the disease of respiratory tract it has got much relation with gastro intestinal tract, as its origin is in the pitta sthana. Embryologically also both the stomach and lungs developed from the same rudiment node, only during the process of development they are separated into two parts and lodged in two cavities, but still both of them have identical physiological and pharmacological actions. When emetics is administered simultaneously stimulate the bronchial mucosa causing expectoration in addition to its usual irritation in the gastric

mucosa. In other hand similarly high dose of expectorants produce emesis, more over it is found that during pathological condition both the systems behave similarly. Report suggest that bronchial asthma patient usually suffer from Hypochlorhydria or achlorohydria. Charaka further mentioned that the pathogenesis of Shwasaa is not only limited to respiratory and gastrointestinal tract, but the heart is also affected in long standing cases.

In the second phase charaka has given a common pathogenesis for all the 5 types of Shwasaa roga. Here he described that vayu associated with kapha obstruct the air passages, in and out airflow is obstructed which produce many clinical manifestations of Shwasaa roga ¹⁶. Chakrapani stated that obstruction is in pranvaha, udakvaha and annavaha srotas, here along with respiratory difficulty there is also derangement in the circulation of liquid i.e. rasa,udaka.

In the third phase he gives a special samprapti for Tamak Shwasa,he has emphasized on the issue that vayu become pratiloma in Tamak Shwasa. It probably indicates expiratory airway obstruction. He further stated the involvement of head and neck in this disease, it maybe refer to the fact that accessory muscles of respiration attached to the head & neck are affected. Increased secretion of kapha hamper in free flow of air produces ghur-ghura dhvani, here to overcome this situation the respiratory rate is highly increased in patient of bronchial asthma ¹⁷

vikriti vidnyana of Tamaka Shwasaa

Dosha: vata & kapha

Dushya: rasa

Srotas: pranvaha srotas

Adhistan: uraha (phuphusa)

Vyapti: Shwasa ansansthana

Udbhava: Amashaya samuttha

Sroto dushti lakshana: sanga, vimarg gaman

Agnimandya: jatharagni, rasagni

Mala: kapha, pureesh

Vyadhi prakara: aashukari

SPIROMETRY:

Objective measures of lung function have always been a desire for physicians for centuries. Introduced by Hermanssen in 1933 became popular. In 1947, Tiffeneau and Pinelli from Paris proposed the measurement of Forced Expiratory Volume after 1 second as a replacement for MVV for assessing airflow

obstruction, because the MVV manoeuvre was too tiring for the patients. The Flow-Volume curves were first described in 1960, and gave an elegant visual synthesis of maximum expiratory and inspiratory flow over the whole FVC range. It has now been almost 150 years since Spirometry was introduced to measure lung function, but unfortunately, this instrument has not yet found an important place in the physicians clinic and hospital, unlike the sphygmomanometer, thermometer and X-ray. It is estimated that only 10-30% of primary care physicians in the developed world have a spirometer in their clinic. In India, 10% of General Practitioners, 20% of General Physicians and 50% of Chest Physicians use Spirometry.

Material and methods:

Patient- patients having signs & symptoms of Tamak Shwasa are taken for study.

spirometry instrument, Mouth piece, Nose clip

Determination of sample size

Considering 4% prevalence of Bronchial asthma (Chest foundation of India) and 10% dropout, sample size will be 40.

Inclusion Criteria:

Male and Female Patients of age group 20-60 years who have sign & symptoms of Tamak Shwasa.

Exclusion Criteria:

Patient suffering from any major illness like AIDS, TB, Malignancy, HBsAg cases will be excluded also

Patient suffering with pleural effusion, COPD, anaemia, ascites etc.

PLAN OF WORK:

Prior, informed written consent taken from each & every patient Selected for study.

Clinical examination done with the help of case record format of each and every patient selected for the study.

Pranvaha srotodushti lakshana observed in each selected patient of Tamak Shwasa.

Spirometry done for the assess of pranvaha srotodushti in each selected patient of Tamak Shwasa.

Relation between result of spirometry and Pranvaha srotodushti in Tamak Shwasa studied.

Observations

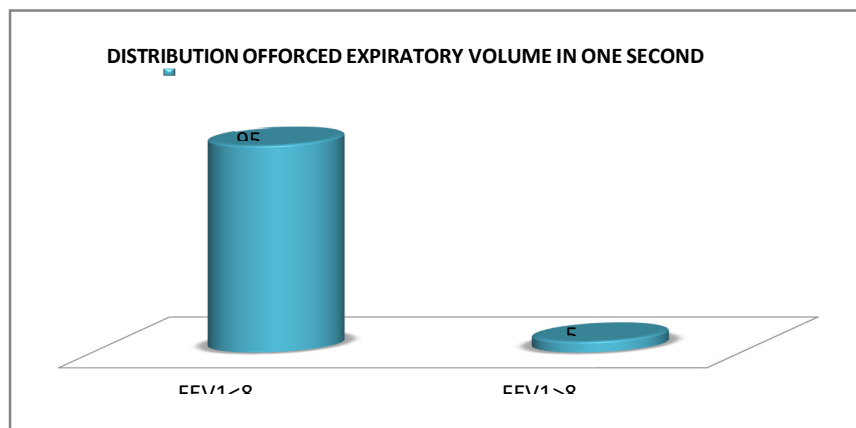
Distribution according to severity (Table no. 01)

Symptoms of Pranvaha srotas dushti	Number of patients
Mild (only 1 symptom)	02

Moderate (2 to 3 symptoms)	28
Severe (more than 4 symptoms)	10

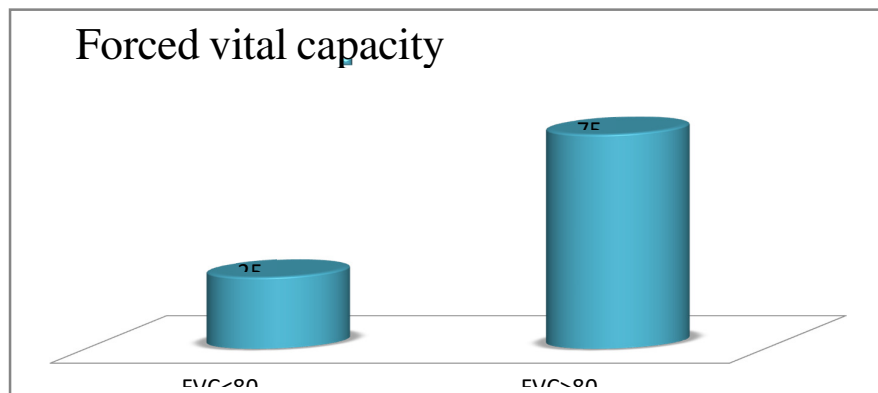
Distribution of forced expiratory volume (Table no.02)

Forced expiratory Volume in one second	Total	Percentage
FEV1<80%	38	95%
FEV1>80%	2	5%



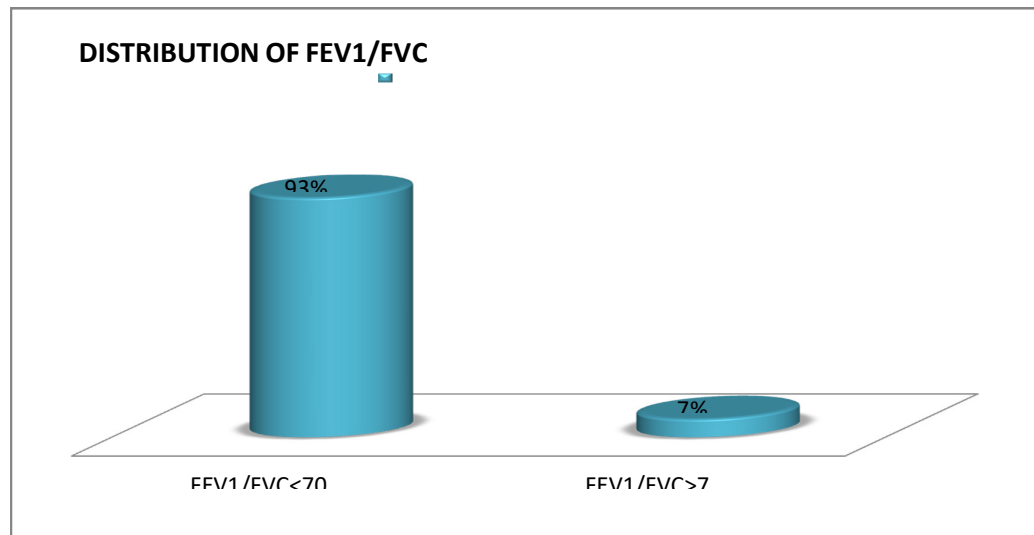
Distribution of forced vital capacity (Table no.03)

Forced vital capacity	Total	Percentage
FVC<80%	10	25%
FVC>80%	30	75%



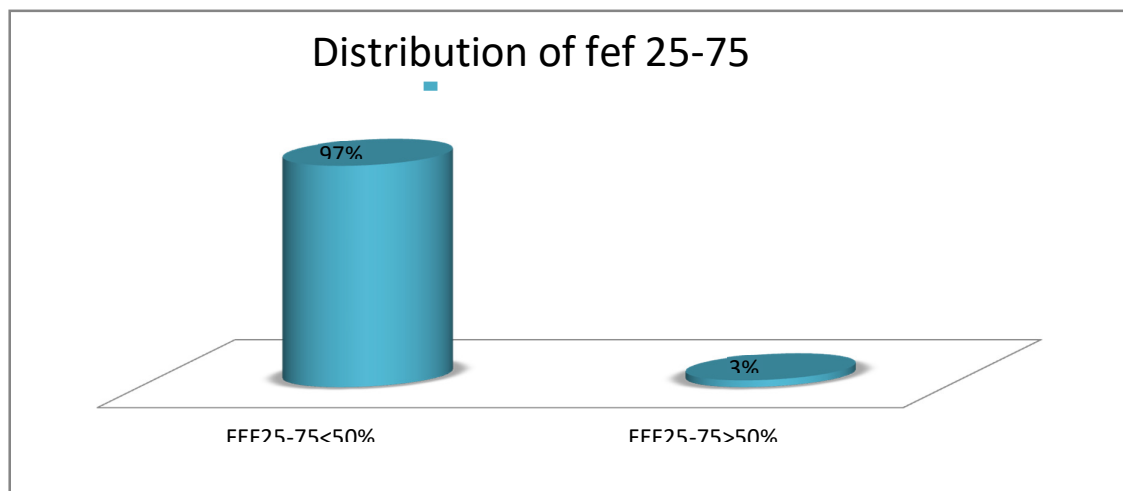
Distribution according to *fev1/fvc* (Table no. 04)

FEV1/FVC	No. Of Patients	Percentage
FEV1/FVC<70%	37	93%
FEV1/FVC>70%	3	7%



Distribution of FEF 25-75 (Table no.05)

<i>FEF25-75</i>	<i>No. of Patient</i>	<i>Percentage</i>
<i>FEF 25-75<50%</i>	39	97%
<i>FEF25-75>50%</i>	1	3%



Statistical analysis

To prove whether there is an association between the symptoms of Pranavaham srotas dushti and Spirometry, Chi square test is applied.

Chi square table

		Pranavaha srotas dushti lakshane			Total
		Mild	Moderate	Marked	
Spirometry (FEV1/FVC)	<70	1	26	10	37
	>70	1	2	0	3
Total		2	28	10	40

Chi square (X^2) value of the above table is 6.023. Degrees of freedom (df) = 2

Chi square (X^2) tabulated value of df = 2 is 5.99 at $P < 0.05$ i.e. at 95 % level of significance.

Conclusion:

As the calculated chi square (X^2) value is higher than the tabulated (X^2) value, we should reject the null hypothesis and accept the alternative hypothesis.

Probability of the difference occurring in Pranvaha srotas dushti lakshane and Spirometry by chance is less than 5 out of 100 cases, i.e. probability of not getting the difference between Pranvaha srotas dushti lakshane and Spirometry in nature is 95%. So the Pranvaha srotas dushti lakshane and Spirometry are associated or interdependent.

Method 2**Correlation between Symptoms of pranvahasrotas dushti and FEV1/FVC**

Correlation coefficient i.e. r , for Pranvaha srotas dushti lakshane and Spirometry (FEV1/FVC) is - 0.24.

As the correlation coefficient (r) is lie between -1 and 0, weshould predict that the there is –Moderately Negative Correlation between the Pranvaha srotas dushti lakshane and Spirometry. It means these two variables are inversely proportional to each other. Lakshans of pranvaha srotas dushti increases then Spirometry value decreases and vice-versa.

Correlation between the Pranvaha srotas dushti lakshne andFEV1

Correlation coefficient i.e. r , for Pranvaha srotas dushti lakshane and Spirometry (FEV1) is - 0.088.

As the correlation coefficient (r) is lie between -1 and 0, weshould predict that the there is –Moderately Negative Correlation between the Pranvaha srotas dushti lakshane and Spirometry (FEV1). It means these two variables are inversely proportionalto each other. Lakshans of pranvaha srotas dushti increases thenSpirometry (FEV1) value decreases and vice-versa.

Correlation between the Pranvaha srotas dushti lakshne andFVC

Correlation coefficient i.e. r , for Pranvaha srotas dushti lakshane and Spirometry (FVC) is + 0.049.

As the correlation coefficient (r) is lie between 0 and +1,we should predict that the there is –Moderately Positive Correlation between the Pranvaha srotas dushti lakshane and Spirometry (FVC). It means these two variables are directly proportional to each other i.e. these two variables are interdependent. Lakshans of pranvaha srotas dushti increases then Spirometry (FVC) value also increases.

Correlation between the Pranvaha srotas dushti lakshne andFEF 25-75

Correlation coefficient i.e. r , for Pranvaha srotas dushti lakshane and Spirometry (FEF 25-75) is - 0.011.

As the correlation coefficient (r) is lie between -1 and 0, weshould predict that the there is –Moderately Negative Correlation between the Pranvaha srotas dushti lakshane and Spirometry (FEF 25-75). It means these two variables are inversely proportional to each other. Lakshans of pranvaha srotas dushti increases then Spirometry (FEF 25-75) value decreases and vice- versa.

DISCUSSION

In the present study 40 patients of TamakShwasa wereregistered. The disease was diagnosed on the basis

of sign and symptoms as described in ayurvedic text. spirometry test was done on the diagnosed *tamakShwasa* patients to observe the relation between pranvahasrotodushti in tamakShwasa and spirometry result.

FEV1 (forced expiratory volume in one second):

In the present study FEV1 below normal was seen in 38 patient i.e. in 95% patient, normal were only 2 patient i.e.5%. so it showsthat in tamakShwasa FEV1 is below normal level. i.e. patient takes more time to exhale than in normal patient.

FVC (forced vital capacity) :

In TamakShwasa FVC was seen normal in 30 patient i.e. 75% andbelow normal in 10 patient i.e. 25%. Showing 75% patients having obstructive lung pathology and 25% having mixed lung disease pathology.

FEV1/FVC:

Out of 40 patients included in the study 37(93%) patients had FEV1/FVC below 70% i.e. below normal and in 3 (7%) patients were having FEV1/FVC, normal. Showing that in tamakShwasa FEV1/FVC is below normal.

FEF 25-75

Out of 40 patient 39 (97%) patients had FEF 25-75 below 50% i.e. below normal and 1 (3%) patient had FEF 25-75 above normal. Reflecting small airway obstruction.

CONCLUSION

After analyzing all the data and observations, following conclusion hasdrawn:

Pranvaha sroto dushti is present in TamakShwasa.

There is significant p o s i t i v e c o - relation between severity of TamakShwasa and Spirometry-reading.

FEV1 and FEV1/FVC is below normal in TamakShwasa.

FVC is normal in TamakShwasa.

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