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AN OBSERVATIONAL STUDY ON STATUS OF *PRANAVAHA SROTAS* WITH THE HELP OF SPIROMETER IN INDIVIDUALS OF DIFFERENT OCCUPATION

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ABSTRACT

Introduction: *Pranavaha Srotas* is first & important *Srotas*, which carries *Prana* all over the body. By studying the *Srotas Moolsthana, Vidhalakshanas, Pranavaha Srotas*, etc. idea of this *Srotas* can be understood and how it is related to respiratory system & internal & external respiration can be verified. Main function of *Pranavaha Srotas* is to provide the medium, through which *Prana* flows, which is governed by *Vata.* General causes of vitiation of *Pranavaha Srotas* include suppression of natural urges; seasonal, environmental, lifestyle and dietary patterns that are *Ruksha, Sita* in nature; exertion and exercise while hungry etc. they produce different symptoms like *Kasa, Shwasa, Hikka* etc. **Methodology:** To study the status of *Pranavaha Srotas* with the help of spirometer in individuals of different occupation. It was an observational study with a sample size of 400 subjects and 4 Groups, 100 subjects in each group, who were exposed to different occupational environments. Assessment parameters used in the present study were *Pranavaha Sroto Dushti Lakshanas* as per different *Acharyas* and the Digital Spirometer Reading. **Result & Conclusion**: After studying all the observations and the statistical data, one can appreciate that the P-Value is found to be less than 0.05. Since the variables were qualitative, Chi-Square test was used to find out the Association. After calculating P-value it was found that there is a significant association between the chosen variables i.e. *Pranavaha Sroto Dushti Lakshanas* as per classics and the Digital Spirometer findings in the subjects of different occupation.

KEYWORDS: *Srotas, Pranavaha Srotas,* Spirometer, Asthma, Occupational Disorders.

INTRODUCTION

The concept of *Srotas* is defined scientifically in *Ayurvedic text Acahrya Charaka* says that any entities or *Bhavas* in the body do not arise or decay without *Srotas.* As *Acharya* stated that *Srotomayam hi Shariram* means that living body is composed of enumerable channels which may be macro or micro on the basis of their morphology act as transporting system of body and classic *Acharya* clearly mention that the overall health of a person depend upon the *Srotas*.[1] *Srotas* performs such function which helps to nourish the entire body any disturbance at the level of *Srotas* either structurally or functionally leads to genesis of disease. *Srotas* not only involve in passive transportation but also involve in active transportation. Diffusion, osmosis and filtration are the processes utilized by various *Srotas. Srotas* transport oxygen through *Pranavaha Srotas*, water through *Udakavaha Srotas*, Red blood cells through *Raktavaha Srotas* and urine through *Mutravaha Srotas*. *Pranavaha Srotas* transport *Pranavayu* from lungs to each body cell through diffusion. Any Structural and functional integrity of these *Srotas* is needed in order to maintain normal physiology, likewise impairment in this integrity can lead to pathological state.[2] The spirometery is a valuable tool to assess lung function in the initial asymptomatic stages of respiratory dysfunction, as compared to other tools. It has been documented that only spirometery enables the detection of chronic obstructive pulmonary disease(COPD) almost 5 – 10 years before shortness of breath develops in the workers of different occupations who are asymptomatic, may have abnormal lung function. Hence, the purpose of this study is to assess the lung function of different occupational workers by means of spirometery.[3]

AIM AND OBJECTIVES

Aim - An observational study on the status of *Pranavaha Srotas* with the help of spirometer in individuals of different occupation.

Objectives

1. To perform *Parikshan* of *Pranavaha Srotas* as per proforma in the individuals of different occupation.
2. To study and compare between normal and abnormal *Pranavaha Srotas* functioning in different *Ayurvedic Samhitas* and texts.
3. To carry out an observational study on the status of *Pranavaha Srotas* of individuals employed in different occupation with the help of Spirometer.

4. To assess / evaluate the degree of vitiation in *Pranavaha Srotas* because exposure to different occupation.

MATERIALS AND METHODS

Source of Data: Individuals from haridwar district and its periphery working in different Industrial environment were selected for the study.

Sample size and Sampling methods

- A total 400 different occupations non-smoking Male workers from haridwar city & its periphery who were working for more than since two years, at least 8 hours/day in the age group of 20 to 45 years, were selected as the study group.
- The subjects with presence of history of any respiratory illness, abnormal or chest surgery, neuromuscular disease or musculoskeletal abnormalities involving the upper trunk or rib cage, and those who were smokers, were excluded from the study.
- The Ethical committee clearance and an informed consent of the subject were taken.
- All the 400 workers were classified into four different groups according to their occupation.
- All the subjects were first interviewed using a questionnaire demographic data, smoking habits, duration of exposure, surgical history, past medical history of any respiratory illness and use of any personal protective equipment resembling a face mask.
- Subject who fulfilled the inclusion criteria were explained the purpose of the study. Spirometery was done in sitting position using the computerized digital Spirometer (RMS MED SPIRER, Helios 702) and the subjects were instructed about the procedure of the FVC (forced vital capacity) maneuver and asked to perform it thrice.
- Proper rest was given in between each trial. The best value of three was recorded. The lung function parameters studied were FVC (forced vital capacity), FEV_1 (forced expiratory volume in one second)

Total No. of Subjects: 300-400

Type of Study: Observational Study

Period of Study: 18 months

Study plan: - For the purpose of study, an appropriate methodology is applied to fulfill the criteria of the research plan in an appropriate frame work. In the present context the different features of *Pranavaha Srotas* were studied in accordance to the references available in

different *Samhitas*. A proforma was developed with appropriate grading to mark the intensity and severity of the result as per the classical features of the *Pranavaha Srotas dushti* i.e.

- GRADE - 0 :- Refers to Negligible effect of Occupation on *Pranavaha Srotas*
- GRADE – 1 :- Refers to MILD,
- GRADE – 2 :- Refers to MODERATE
- GRADE – 3:- Refers to EXTREME effect of Occupation on *Pranavaha Srotas*.

This result was then compared with result of the Digital Spirometery done on the same subjects.

INCLUSION CRITERIA

- Subjects between the age group of 20-45 years of age were selected.
- Those who were working since 2 years were preferred
- Only male subjects were selected.
- Only non - smoker subjects were selected.
- Only those workers were selected who were working for more than at least 8 hours/day.

EXCLUSION CRITERIA

1. A subject who is more than 45 year.
2. Subjects with the present history of any respiratory illness.
3. Subjects with the abnormalities involving the upper trunk or rib cage.

OBSERVATIONS AND RESULTS

Table No 1: Showing the Age wise distribution of 400 subjects.

Age Group	Frequency	Percentage
< 20 Years	7	1.75
20-30 Years	192	48.00
30-40 Years	128	32.00
40-50 Years	73	18.25
TOTAL	**400**	**100.00**

Table No 2:- Showing the Occupation wise distribution of 400 subjects.

Occupation	Frequency	Percentage
Iron Worker	100	25.00
Mason Worker	100	25.00
Miner	100	25.00
Paint Worker	100	25.00
TOTAL	**400**	**100.00**

Table No 3:- Showing the Duration of exposure wise distribution of 400 subjects.

Duration of Exposure	Frequency	Percentage
1-5 Years	201	50.25
6-10 Years	115	28.75
11-15 Years	82	20.50
16-20 Years	2	0.50
TOTAL	**400**	**100.00**

Table No 4:- Showing the Spirometer Reading versus *Ayurvedic* Proforma Grading.

			Ayurvedic Grading				Total
			Grade 0	Grade 1	Grade 2	Grade 3	
Spirometer Reading	WNL	Count	165	0	0	0	165
		%	60.4%	.0%	.0%	.0%	41.3%
	Mild Obstruction	Count	5	29	0	0	34
		%	1.8%	30.5%	.0%	.0%	8.5%
	Mild Restriction	Count	68	50	0	0	118
		%	24.9%	52.6%	.0%	.0%	29.5%
	Moderate Obstruction	Count	2	0	1	0	3
		%	.7%	.0%	3.8%	.0%	.8%
	Moderate Restriction	Count	24	16	25	0	65
		%	8.8%	16.8%	96.2%	.0%	16.3%
	Severe Restriction	Count	9	0	0	6	15
		%	3.3%	.0%	.0%	100.0%	3.8%
Total		**Count**	**273**	**95**	**26**	**6**	**400**
		%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Table No 5:- Showing the Result of Spirometer Reading versus Proforma Grading After the Application of the Pearson Chi-Square Test.

	Value	df	P-Value
Pearson Chi-Square	446.096[a]	15	0.000
Likelihood Ratio	320.554	15	0.000
Linear-by-Linear Association	119.227	1	0.000
No. of Valid Cases	**400**		

Table No 6:- Showing the FEV1/FVC RATIO CALCULATED BY DIGITAL SPIROMETERY AND COMPARED WITH *AYURVEDIC* GRADING.

			Ayurvedic Grading				Total
			Grade 0	Grade 1	Grade 2	Grade 3	
FEV1/FVC Ratio	< 65%	Count	2	0	0	0	2
		%	.7%	.0%	.0%	.0%	.5%
	< 84 %	Count	2	1	1	0	4
		%	.7%	1.1%	3.8%	.0%	1.0%
	< 95%	Count	12	27	0	0	39
		%	4.4%	28.4%	.0%	.0%	9.8%
	> 95%	Count	257	67	25	6	355
		%	94.1%	70.5%	96.2%	100.0%	88.8%
Total		**Count**	**273**	**95**	**26**	**6**	**400**
		%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Table No 7:- Showing the FEV1/FVC RATIO CALCULATED BY DIDGITAL SPIROMETERY AND COMPARED WITH *AYURVEDIC* GRADING After the Application of the Pearson Chi-Square Test.

	Value	df	P-Value
Pearson Chi-Square	53.103[a]	9	0.000
Likelihood Ratio	46.674	9	0.000
Linear-by-Linear Association	4.056	1	0.044
No. of Valid Cases	**400**		

Table No 8:- Showing the FVC CALCULATED BY DIGITAL SPIROMETER AND COMPARED WITH *AYURVEDIC* GRADING.

			Ayurvedic Grading				Total
			Grade 0	**Grade 1**	**Grade 2**	**Grade 3**	
FVC	**<44 %**	Count	7	0	0	6	13
		%	2.6%	.0%	.0%	100.0%	3.3%
	< 64%	Count	24	16	25	0	65
		%	8.8%	16.8%	96.2%	.0%	16.3%
	<80%	Count	68	53	0	0	121
		%	24.9%	55.8%	.0%	.0%	30.3%
	> 80%	Count	174	26	1	0	201
		%	63.7%	27.4%	3.8%	.0%	50.3%
Total		**Count**	**273**	**95**	**26**	**6**	**400**
		%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Table no 9:- Showing the FVC CALCULATED BY DIGITAL SPIROMETER AND COMPARED WITH *AYURVEDIC* GRADING After the Application of the Pearson Chi-Square Test.

	Value	Df	P-Value
Pearson Chi-Square	356.309[a]	9	0.000
Likelihood Ratio	182.806	9	0.000
Linear-by-Linear Association	106.846	1	0.000
No. of valid cases	**400**		

DISCUSSION AND CONCLUSION

During the study all the details, questionnaire, proforma were filled honestly without being biased so as to reach on some result. Different tables, graphs, charts were drawn to evaluate the changes and fluctuations in the variables or to record the movement of different variables in relation to each other. Total number of Subjects selected were 400 in number. Grouping of the subjects was done for the ease of study and Four Groups were made. Each group had 100 subjects according to the different occupations they were involved in Digital Spirometer was used to take out the Vital Capacity, FEV, FEV/ FVC ratio, FEV 1 / FVC ratio. After filling

the master table with all the said parameters, data was analyzed statistically to reach on a result. Since the data so obtained was Qualitative in nature, Chi- Square test was applied to study the association between the variables.

1. First table shows the Age wise distribution of 400 subjects.
2. Second table illustrates the Occupation wise distribution of 400 subjects.
3. Third table is about the Duration of exposure wise distribution of 400 subjects.
4. In the table Four & Five, an attempt was made to plot the Spirometer reading obtained after digital spirometery of the subjects against the *Ayurvedic* grading of *Pranavaha sroto dushti Lakshanas* obtained after the filling up of the proforma by the *lakshanas* observed in the subjects. After the plotting the data, Chi – square test was applied to analyze the value of P. It was found that the value of P was less than 0.05. So it was concluded that there is a significant association between *Ayurvedic* Gradation of *Pranavaha sroto dushti Lakshanas* and Spirometer Reading.
5. Table Six & Seven explains the relation between FEV1/FVC ratios calculated by digital Spirometery and *Ayurvedic* Gradation of *Pranavaha sroto dushti Lakshanas* obtained after the filling up of the proforma by the *lakshanas* observed in the subjects. After the plotting the data, Chi –square test was applied to analyze the value of P. It was found that the value of P was less than 0.05. So it was concluded that there is a significant association between FEV1/FVC ratio and *Ayurvedic* Gradation of *Pranavaha Sroto Dushti Lakshanas.*
6. Table Eight & Nine explains the relation between FVC calculated by digital spirometer and *Ayurvedic* gradation of *Pranavaha Sroto Dushti Lakshanas.* After the plotting the data, Chi–square test was applied to analyze the value of P. It was found that the value of P was less th*an* 0.05.So it was concluded that there is a significant association between FVC and *Ayurvedic* Gradation of *Pranavaha Sroto Dushti Lakshanas.*

Hence, it proves that our Alternate Hypothesis is correct for the said research work statistically and shows a strong Association between the chosen variables i.e. Digital Spirometery Reading and the *Pranavaha sroto dushti Lakshanas as* per *Ayurvedic* Classics. So, it can be concluded one can predict the earliest changes in the Respiratory system by just looking in to the *Pranavaha Sroto Dushti Lakshanas* even in the absence of the Spirometer as both show a strong association.

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