Prevalence of Obstructive Airway Disease in Patients with Ischemic Heart Disease and Hypertension

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ABSTRACT

Introduction: This is a case-control study comparing various lung function indices suggestive of OAD amongst the patients with ischemic heart disease and /or hypertension and healthy control population without ischemic heart disease and/or hypertension.

Methods: In present study total of 100 subjects are cases, which include subjects with hypertension and / or ischemic heart disease.

Results: Out of total 100 cases, 34 are IHD 37 are with essential hypertension and 29 are with IHD and Hypertension. In case population total 59 subjects are male (IHD,HTN: 18; IHD:23 ; HTN: 18) and 41 subjects are female (IHD,HTN: 12; IHD:11; HTN: 18). In control group total 74 are male and 26 are female Descriptive Statistical analysis for case group in following table number 3 shows mean values of age: 53.24, SBP: 157, DBP: 90.74, FEV1:1.531, FVC: 1.897, FEV1/FVC ratio %: 80.95, FEF 25-75:1.684, PEFR: 3.6, BMI: 22.71 Kg/m². Out of a total of 37 hypertensive patients, 8 are having (21.62 % (OR=23.31) 95% confidence interval) OAD. Out of a total 34 IHD patients, 6 are having (17.34 % (OR=21.21) 95% confidence interval) OAD. Out of total 29 IHD with hypertensive patients, 4 are having (13.79 % (OR=15.84) 95% confidence interval) OAD. The mean FEV1/FVC (%) in the male population is significantly low (58.396) compared to the female population (64.670) amongst the case group ($p < 0.001$). The mean SBP and DBP is significantly high in female population (163.333; 100.667) compared to male population (152.667; 89.600) with $p < 0.05$.

Conclusion: The use of FEV1 and FEV1/FVC % as the part cost-effective investigation of any health assessment of middle-aged patients should be considered. Patients with IHD and hypertension should routinely undergo inexpensive investigation like spirometry to detect the presence of underlying asymptomatic or subclinical OAD.

Key Words: Airway Disease, IHD, Hypertension, FEV, FVC

INTRODUCTION

There is a strong association between IHD and or essential hypertension with (spirometric indices like FEV1 and FVC) increased prevalence of OAD (obstructive airway disease). Chronic obstructive pulmonary disease (COPD) is a common and debilitating disease, characterised by airflow limitation that is not fully reversible and usually progressive. This disease represents an increasing health burden worldwide and is the only leading cause of death that still has a rising mortality rate in industrialised countries.¹

Lungs, the organs of the respiration, often reflect the internal milieu of the human body. Therefore they are referred to as "Mirror of the human body". Indeed, reduced lung function is known to be associated with increased all-cause mortality,

cardiovascular mortality and morbidity, stroke, hypertension, diabetes. Regular measurement of lung functions can thus provide an all-important early clue to find out the people at high risk to a variety of diseases. Though measurement of lung function by spirometry is an easy, non-invasive test, it remains one of the most underutilized tools in the medical world.²

The incidence of cardiovascular disease and death associated with hypertension is increased among men with reduced lung function. The synergistic interaction between hypertension and lung function was independent of smoking and other potential confounders.³ Lung function is inversely associated with future blood pressure increase. It is suggested that this association could contribute to the relationships between lung function and the incidence of cardiovascular disease.

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The decline in lung function, measured by FEV1 is a predictor of death, independent of average FEV1 and risk factors for cardiovascular disease.⁴

Reduced FEV1 identifies undiagnosed COPD, has a comparable utility to that of serum cholesterol in assessing cardiovascular risk. So far Prevalence of OAD inpatient with IHD and hypertension has been inadequately studied in India. This study was conducted at Krishna institute of medical sciences Karad to assess the prevalence of OAD inpatient with IHD and essential hypertension and its comparison with the normal control population.

MATERIAL AND METHODS

Study design

Setting

Krishna Institute Of Medical Sciences University, Karad, Maharashtra; India.

Study population

Total 100 control subjects are recruited and 100 case subjects are included in this study. Total of 100 cases is recruited from the outpatient department (OPD) of the KIMS, Karad. Control subjects (n=100) are recruited amongst the relatives of the patients participating in the study matching for age and sex distribution.

The study protocol was approved by the ethical committee of Krishna Institute of Medical Sciences Karad University, and written informed consent was obtained from all participants (case and control).

Inclusion criteria:

1. Subjects with known essential hypertension or IHD or both for the case.
2. Age ≥ 35 and ≤ 65 years.
3. Healthy subjects without HTN and IHD for control.

Exclusion criteria:

1. Known case of COPD, ILD, occupational lung disease and pulmonary tuberculosis
2. Subjects with CCF / any cardiorespiratory disease
3. Smokers
4. Any evidence of respiratory tract infection
5. Patients with acute myocardial infarction and unstable angina
6. Patient with secondary hypertension
7. Patients whose respiratory functions revealed abnormality suggestive of restrictive lung disease

Method: Patients presenting to the KIMS at medicine outpatient department were recruited as cases. These patients are already diagnosed to have IHD and / or hypertension and are on regular follow up.

- II). Spirometry is done without any charges to all subjects who participated in this study.

RESULTS

In the present study total of 100 subjects are cases, which include subjects with hypertension and / or ischemic heart disease. Out of total 100 cases, 34 are IHD 37 are with essential hypertension and 29 are with IHD and Hypertension as shown in table number 1.

Frequency Distribution of hypertensive and / or IHD (case population)

In case population total 59 subjects are male (IHD and HTN: 18; IHD:23 ; HTN: 18) and 41 subjects are female (IHD,HTN: 12; IHD:11; HTN: 18). In the control group, total of 74 are male and 26 are female.

Frequency Distribution of male & female hypertensive and / or IHD

Descriptive Statistical analysis for case group in following table number 3 shows mean values of age: 53.24, SBP: 157, DBP: 90.74, FEV1:1.531, FVC: 1.897, FEV1/FVC ratio %: 80.95, FEF 25-75:1.684, PEFR: 3.6, BMI: 22.71 Kg/m².

Descriptive Statistical analysis for case group

Descriptive Statistical analysis for **control** group in following table number 3 shows mean values of age:45.82,**SBP:119.62, DBP:79.66**, FEV1:2.42, FVC:2.78, **FEV1/FVC ratio %: 87.62**, FEF 25-75:3.05, PEFR: 6.4, BMI:21.82 Kg/m². (Table No. 4)

Descriptive Statistical analysis for the control group

Total Hundred patients with diagnosed ischemic heart disease and/ or hypertension (mean age 53.240 yrs- SD: 11.037; FEV1/FVC %: **80.956-SD: 14.366**) and 100 healthy subjects (mean age 45.820 yrs – SD: 8.390; FEV1/FVC %: **87.623 – SD: 7.219**) are recruited in this study.

Comparing both case and control population mean values of all spirometric variables are significantly low in case group and other dependant variables like SBP and DBP are significantly high with $p=0.005$.

In multiple correlation analysis of various Spirometric parameters (FEV1, FEV1/FVC %, FVC, FEF 25-75 and PEFR) are correlated with an independent variable like age, SBP, DBP, and IHD in the case group, they are significantly associated with reduced FEV1, FEV1/FVC %, FVC, FEF 25-75 and PEFR with $p=0.005$. All spirometric variables are negatively correlated with age, hypertension (SBP, DBP) and IHD, Spirometric variables are significantly low in subjects with IHD and hypertension as shown in table number 1.

In multivariate analysis (MANOVA) spirometric variable like FEV1, FEV1/FVC %, FVC, FEF 25-75 and PEFR are compared with factors like IHD, HTN and covariates like age; SBP; DBP we found that SBP ($p=0.005$), DBP ($p=0.05$), height ($p=0.05$), weight ($p=0.042$), IHD and hypertension ($p=0.0001$) are strongly associated with reduced pulmonary functions like FEV1, FEV1/FVC %, FVC, FEF 25-75 and PEFR. (Table No. 2).

In univariate analysis (ANOVA) low FEV1 is significantly associated with high DBP ($p=0.038$), HTN and IHD ('p' value of 0.008). Low FEV1/FVC % is significantly associated with increasing age ($p=0.007$), high SBP ('p' value of 0.050), high DBP ('p' value of 0.036), high weight ('p' value of 0.008) and HTN and IHD ($p=0.034$). Low FVC is significantly associated with HTN and IHD ('p' value of 0.050). FEF 25-75. Low PEFR is significantly associated with HTN and IHD ($p=0.010$). FEF is not statistically associated with any of the dependent variables.

In present study total, 18 subjects from case population (IHD and/or HTN) are having FEV1/FVC% ratio ≤ 0.7 and 82 are having >0.7 and in control population total 2 subjects had FEV1/FVC% ratio ≤ 0.7 and 98 subjects are having >0.7 ($p=0.000162441$). (Table No. 3)

In pearson correlations linear regression spirometric variable of pulmonary function test (FEV1/FVC ratio) are negatively correlated with IHD, HTN (-0.201), age (-0.339), SBP (-0.124), DBP (-0.150), BMI (-0.012). The maximum regression coefficient is seen with IHD, hypertension ($p=0.032$), age ($p=0.0001$), height ($p=0.049$), and weight ($p=0.012$). (Table No. 9)

In Multivariate 't'-Test result for paired datasets of pulmonary function test (FEV1, FEV1/FVC%, FVC, FEF 25-75, PEFR) in control and case shows that the reduction in FEV1, FEV1/FVC%, FVC, FEF 25-75, PEFR in case population is significant compared to control population with $P=0.0001$ as shown in table number 4

In 't'-Test result for paired datasets of pulmonary function test (FEV1/FVC (%)) in control and case shows that the reduction in FEV1/FVC (%) in case population is significant compared to control population with $p=0.00017$ as shown in table number 6

In multiple correlation results for case population when pulmonary function test variables correlated with the independent variable (SBP, DBP, IHD) they are statistically significantly reduced ($p=0.00017$) as shown in table No. 7

The odds ratio for FEV1/FVC ratio <0.7 in case vs. Control population:

1. Total 18 subjects were with FEV1/FVC ratio <0.7 and 82 are >0.7 FEV1/FVC ratio in case population.

2. Total 2 subjects were with FEV1/FVC ratio <0.7 and 98 are >0.7 FEV1/FVC ratios in control population.

Out of a total of 18 subjects from case population with OAD, three are females and 15 are male with a ratio of 1:5. In female with FEV1/FVC <0.7 (mean - 64.67) two are hypertensive and one is with IHD (old MI) and hypertension (mean SBP: 163.33; DBP: 100.66) and mean age is 51.66 yrs. In male with FEV1/FVC <0.7 (mean - 59.44), six are hypertensive and six are with IHD (old MI; silent myocardial ischemia; and stable angina) three are with IHD and hypertension (mean SBP: 154.4; DBP: 91.44) and mean age is 56.61 yrs. Mean FEV1/FVC (%) of subjects with IHD and hypertension are significantly low (53.75) compared with only IHD (56.58) and hypertension (65.79) with 'p' value of <0.0015 . Overall mean SBP and DBP are significantly high in female compared to male subjects ($p<0.00231$).

Out of a total of 37 hypertensive patients, 8 are having (21.62 % (23.31) 95% confidence interval) OAD. Out of a total of 34 IHD patients, 6 are having (17.34 % (21.21) 95% confidence interval) OAD. Out of total 29 IHD with hypertensive patients 4 are having (13.79 % (15.84) 95% confidence interval) OAD. The mean FEV1/FVC (%) in the male population is significantly high (58.396) compared to the female population (64.670) among the case group ($p<0.001$). The mean SBP and DBP is significantly high in female population (163.333; 100.667) compared to male population (152.667; 89.600) with $p<0.05$.

DISCUSSION

Recent studies have shown a strong association between spirometric indices (FEV1, FEV1 / FVC%, FVC, FEF ^{25-75%}, PEFR) with essential hypertension and or IHD. The subjects with hypertension and IHD have increased prevalence of OAD. This study aimed to determine the prevalence of OAD in patients diagnosed with IHD and hypertension and to compare that with the prevalence of OAD in a healthy population. Very few studies have been conducted in India and overseas as well, in which spirometric variables were studied in a patient with IHD and hypertension.

Our findings cannot be exactly compared with other studies because of the following reasons:

1. Very few studies are available for comparison
2. Other western studies are conducted in a large population group
3. Other western studies are having different race religion like American, Africans, Japanese etc.
4. Majority of studies have compared only FEV1 as only spirometric variable
5. Many of the studies included the elder age group than our study group.

In the present study, a total of 100 subjects are included in the case group, which includes subjects with hypertension and ischemic heart disease. Comparing both case and control population mean values of all spirometric variables were significantly low in case group and other dependant variables like SBP and DBP were significantly high with $p=0.005$.

In multiple correlation analysis of various spirometric parameters (FEV1, FEV1/FVC %, FVC, FEF 25-75 and PEFR) all spirometric variables were negatively correlated with age, SBP, DBP, IHD Spirometric variables are significantly low in subjects with IHD and /or hypertension ($p=0.005$).

In multivariate analysis (MANOVA) SBP ($p=0.005$), DBP ($p=0.05$), IHD and ($p=0.0001$) are strongly associated with reduced pulmonary functions (low FEV1/FVC %).

In univariate analysis (ANOVA) low FEV1 was significantly associated with high DBP ($p=0.038$), HTN, IHD ($p=0.008$). Low FEV1/FVC % is significantly associated with advancing age elderly population ($p=0.007$), high SBP ($p=0.050$), high DBP ($p=0.036$), HTN, IHD ($p=0.034$). Low FVC is significantly associated with height ($p=0.0001$), HTN, IHD ($p=0.050$). Low PEFR is significantly associated with HTN, IHD ($p=0.010$). FEF is not statistically associated with any of the dependent variables like IHD and hypertension.

In the present study total of 18 subjects from the case, the population were having FEV1/FVC% ratio < 0.7 . In control population total 2 subjects have FEV1/FVC% ratio < 0.7 . In the patient with hypertension, IHD and their combination are significantly having low with $p=0.000162441$.

In Pearson correlations linear regression spirometric variable of pulmonary function test (FEV1/FVC %) are negatively correlated with IHD (-0.201), age (-0.339), SBP (-0.124), DBP (-0.150). In multiple correlation results for case population when pulmonary function test variables correlated with various dependant (age) and independent variable (SBP, DBP, HTN and IHD) they are statistically significantly reduced with $p<0.00017$.

Odds ratio for FEV1/FVC ratio < 0.7 in case vs. control population (Two-tailed p -value: 0.0003; Odds Ratio: 10.7560975609756; Relative risk: 1.830). In present study total 18% subjects from case population had FEV1/FVC% < 0.7 and in control population total 2% subjects have FEV1/FVC% < 0.7 . In the patient with hypertension and IHD are significantly having low FEV1/FVC% ($p' = 0.000162441$). We have compared our results with various other studies.

Engstrom, Gunnar et al.³ in their study population of 467 hypertensive men with forced expiratory volume during 1s (FEV1.0) below the median had significantly higher rates of stroke, cardiac events. *The incidence of cardiovascular disease associated with hypertension is increased among men with reduced lung function.* These findings are similar

to our study in which by *Pearson correlations linear regression* spirometric variable of pulmonary function test (FEV1/FVC ratio) are negatively correlated with IHD (-0.201), age (-0.339), SBP (-0.124) and DBP (-0.150). The maximum regression coefficient was seen with IHD and hypertension ($p=0.032$).

Cross-sectional analysis of a total of 5201 men and women 65 years of age and older found that forced vital capacity and FEV1 levels were related positively to height and negatively to age. In our study in multiple correlation results for case population when pulmonary function test variables were statistically significantly ($p=0.00017$) positively correlated with height (+) and negatively correlated with weight (-), age (-) and BMI (-)².

The cohort of 751 men and 940 women found that decline in FEV1 was significantly associated risk factors for cardiovascular disease.⁴

Conny Persson et al.⁵ in their longitudinal population study of 1,462 women, aged 38–60 years in Gothenburg, Sweden, in 1968–1969, concluded that measuring peak expiratory flow is a simple procedure to identify women with an increased risk of cardiovascular disease.

Wu Y et al.⁶ in 6757 Chinese men and women, aged 35–54 yrs. from Beijing and Guangzhou, China found that lung function (FVC, FEV1) varied inversely with baseline systolic (SBP) and diastolic blood pressure (DBP) in all women and Beijing men (correlations: 0.10, -0.18, $P < 0.0001$). These findings are similar to our results were in Pearson correlations linear regression, the spirometric variable of pulmonary function test (FEV1/FVC %) are negatively correlated with IHD (-0.201), age (-0.339), SBP (-0.124) and DBP (-0.150). The Maximum Regression Coefficients was seen with IHD and HTN ($p=0.032$), age ($p=0.0001$), height ($p=0.049$), and weight ($p=0.012$).

Singh B et al.⁷ in their study they found that mean FEV1 / FVC % was lower in **elderly** with Ischaemic Heart Disease (**IHD**) ($p<0.05$). Mean FEV1 /FVC% was significantly lower in **hypertensive** elderly as compared to normotensives ($p<0.05$). Mean FEV1 /FVC% was significantly lower in **diabetic** elderly as compared to nondiabetics ($p<0.05$). They concluded that age-associated significant decline in pulmonary function, which is more with hypertension, diabetes mellitus, coronary artery disease and BMI. These findings are similar to our study.

Study of a total of 105 male and 60 female patients of Kolkata between December 2002 and January 2005 found that 39 male and 21 female patients were diagnosed and grouped in the chronic obstructive pulmonary disease group. Hypertensives (21 males and 7 females) showed an obstructive spirometric pattern. Female overweights ($n=8$) showed an obstructive pattern in spirometry. In ischaemic heart disease

patients (n=6) FEV1% pred. showed a significant reduction in spirometry. These findings are comparable with our study.⁸

Burchfiel CM et al.⁹ In 4451 Japanese-American men from the Honolulu Heart Program who were aged 45 to 68 years. A logistic regression model showed that coronary heart disease was significantly associated with rapid FEV1 decline ($P < 0.07$). These findings are similar to the present study population.

Holger J et al.¹¹ in their sample of 554 men and 641 women, aged 20 to 89 years, from the city of Buffalo found that IHD in the lowest quintile of FEV₁%pred was 2.11 (95% CI, 1.20 to 3.71) and 1.96 (95% CI, 0.99 to 3.88) for men and women, respectively. These results suggest that reduced pulmonary functions are associated with IHD in both genders and could be used as a tool in general health assessment.

CONCLUSION

In the present study, the overall prevalence of OAD is 18% amongst case population and 2% subjects from the control population. Prevalence of OAD in a patient with only hypertension is 21.62 %. Prevalence of OAD in a patient with only IHD is 17.34 %. Prevalence of OAD inpatient with IHD and hypertensive is 13.79 %. In the present study, there is a significant increase in the prevalence of OAD amongst patients with IHD and hypertension compared to the control population. Inpatient with hypertension, IHD (case group) and their combination are having significantly low FEV1/FVC% compared to control group ($p=0.000162441$). All spirometric variables are negatively correlated with the level of hypertension (SBP and DBP). The use of FEV1 and FEV1/FVC % as the part cost-effective investigation of any health assessment of middle-aged patients should be considered. Patients with IHD and hypertension should routinely undergo inexpensive investigation like spirometry to detect the presence of underlying asymptomatic or subclinical OAD. Patients with essential hypertension and / IHD with reduced FEV1/FVC ratio < 0.7 should be followed up regularly to detect progression of OAD requiring therapeutic intervention. Many population-based studies are required to evaluate the relationship between reduced spirometric variables with IHD, hypertension.

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Table 1: Multiple Regression Comparison for Case & Control group population

ANOVA	Individual Regression Details			
	F	DF1	DF2	P
FEV ₁	348.596	1	98	0.000
FVC	31.467	1	98	0.000
FEV ₁ /FVC (%)	0.183	1	98	0.005

Table 1: (Continued)

		Individual Regression Details			
ANOVA		F	DF ₁	DF ₂	P
FEF 25-75		6.211	1	98	0.014
PEFR		47.457	1	98	0.000
SBP		41.485	1	98	0.000
DBP		16.532	1	98	0.000
Intercept Comparison: ANOVA: Common Slope = 0.154					
Source	Sum Sq.	D.F.	Mean Sq.	F	Prob.
Regression	2525906.85	10	252590.685	889.031	0.000

Table 2: Multiple Correlation Results for: Y- Variable Range = Spirometric variables ; X - Variable Range = AGE;SBP;DBP;IHD.

Descriptive Statistics:					
Variable	Mean	Std Dev.	StdErr	N	
FEV1	1.531	0.581	0.058	100	
FVC	1.897	0.642	0.064	100	
FEV1/FVC (%)	80.956	14.366	1.437	100	
FEF 25-75	1.684	0.926	0.093	100	
PEFR	3.600	1.738	0.174	100	
Correlation Matrix		F - Statistic		Correlation Significance	
	R		F	P	
FEV1	0.530	FEV1	5.143	FEV1	0.000
FVC	0.559	FVC	5.972	FVC	0.000
FEV1/FVC (%)	0.523	FEV1/FVC (%)	4.946	FEV1/FVC (%)	0.000
FEF 25-75	0.441	FEF 25-75	3.179	FEF 25-75	0.005
PEFR	0.422	PEFR	2.852	PEFR	0.010

Table 3: Multivariate Analysis

Effect	Wilks Lambda	Ho Df	Error Df	F	Prob.
AGE	0.908	5	81	1.637	0.160
SBP	0.814	5	81	3.692	0.005
DBP	0.878	5	81	2.259	0.050
HTN & IHD	0.403	40	356	2.061	0.000

Table 4: Contingency Table Results For Comparison Between Case And Control Reduced & Normal

Statistic	Value	DF	P
Chi-Square	14.222	1	0.000162441
Yates Correction	12.500	1	0.000406952
Cochran Correction	12.500	1	0.000406952
Log-Likelihood	16.147	1	5.86216E-05
Yates Correction	13.907	1	0.00019213
Fisher (2 Tail)	-	-	0.000205207
Fisher (1 Tail)	-	-	0.000102603

Table 5: Multivariate 't'-Test Result for Datasets.

Variable	Descriptive Statistics					N		P for F
	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL			
FEV ₁	1.531	0.581	0.058	1.415	1.646	100	CASE	0.0001
FVC	1.897	0.642	0.064	1.770	2.024	100	CASE	-
FEV ₁ /FVC (%)	80.956	14.366	1.437	78.106	83.807	100	CASE	-
FEF ₂₅₋₇₅	1.684	0.926	0.093	1.500	1.867	100	CASE	-
PEFR	3.600	1.738	0.174	3.255	3.945	100	CASE	-
FEV ₁	2.427	0.481	0.048	2.331	2.523	100	CONTROL	-
FVC	2.781	0.571	0.057	2.668	2.895	100	CONTROL	-
FEV ₁ /FVC (%)	87.623	7.219	0.722	86.191	89.055	100	CONTROL	-
FEF ₂₅₋₇₅	3.058	0.879	0.088	2.884	3.233	100	CONTROL	-
PEFR	6.400	1.920	0.192	6.019	6.781	100	CONTROL	-

2-tailed t-Test 'p' = 0.0001

Following table number 11 shows Frequency Distribution (Bin) for FEV₁ and FEV₁/FVC (%) for case population.

Table 6: Frequency Distribution (Bin) in case the population for FEV₁/FVC(%) and FEV₁

Frequency Distribution (Bin) in case the population for FEV ₁ /FVC(%) and FEV ₁									
FEV ₁ /FVC (%)	Midpoint	n	Cum. N	Cum. %	FEV ₁	Midpoint	n	Cum. N	Cum. %
40.000	45.000	2	2	2.000	0.300	0.450	1	1	1.000
50.000	55.000	10	12	12.000	0.600	0.750	14	15	15.000
60.000	65.000	6	18	18.000	0.900	1.050	18	33	33.000
70.000	75.000	22	40	40.000	1.200	1.350	16	49	49.000
80.000	85.000	35	75	75.000	1.500	1.650	25	74	74.000
90.000	95.000	21	96	96.000	1.800	1.950	9	83	83.000
100.000	105.000	3	99	99.000	2.100	2.250	4	87	87.000
110.000	115.000	0	99	99.000	2.400	2.550	12	99	99.000
120.000	125.000	0	99	99.000	2.700	2.850	0	99	99.000
130.000	135.000	1	100	100.00	3.000	3.150	1	100	100.00

Table 7: 't' test result for paired datasets of pulmonary function test (FEV₁/FVC (%) in control and case.

t-Test Result for		Set 1 Range = control		Set 2 Range = case		Descriptive Statistics	
Variable		Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
FEV ₁ /FVC (%) Control		87.623	7.219	0.722	86.191	89.055	100
FEV ₁ /FVC (%) Case		80.956	14.366	1.437	78.106	83.807	100
2-tailed t-Test							
Ho. Diff	Mean Diff.	SE Diff.		T	DF	P	
0.000	6.666	1.586		4.203	99.000	0.00017	

Table 8: Multiple Correlation Results for: Case population

Multiple Correlation Results for: Case population					
Y- Variable Range = SPIROMETRIC VARIABLES ; X -Variable Range = SBP;DBP;IHD,HTN					
Correlation Matrix	F -Statistic		Correlation Significance		
	R		F		P
FEV ₁	0.530	FEV ₁	5.143	FEV ₁	0.001
FVC	0.559	FVC	5.972	FVC	0.001
FEV ₁ /FVC (%)	0.523	FEV ₁ /FVC (%)	4.946	FEV ₁ /FVC (%)	0.001
FEF 25-75	0.441	FEF 25-75	3.179	FEF 25-75	0.005
PEFR	0.422	PEFR	2.852	PEFR	0.010