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A Study Of Sympathetic And Parasympathetic Autonomic Dysfunction In Asthmatic Patients In Gwalior Region

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ABSTRACT

INTRODUCTION -Asthma is a chronic inflammatory disorder of the airways. Asthma cannot be cured, but could be controlled. The autonomic nervous system controls several aspect of airway function. Any abnormality in autonomic regulation of the airways, therefore, may lead to bronchospasm, airway edema and excessive mucous secretion, which are the event that take place in pathogenesis of airway obstruction in bronchial asthma.

OBSERVATIONS: In the present study, 32 patients (64%) were tested positive for autonomic dysfunction out of 50 cases. maximum number of cases i.e. 24(48%) out of 50 had parasympathetic autonomic dysfunction, and 4 cases (8%) had isolated sympathetic dysfunction while 8 cases (16%) were observed with both parasympathetic and sympathetic dysfunction.

CONCLUSION: prevalence of parasympathetic dysfunction is more common than both sympathetic and parasympathetic involvement and isolated Sympathetic dysfunction.

KEYWORDS :

INTRODUCTION: Asthma is a chronic inflammatory disorder of the airways. No single histopathologic feature is pathognomonic but common findings include inflammatory cell infiltration with eosinophils, neutrophils, and lymphocytes (especially T lymphocytes); goblet cell hyperplasia, sometimes with plugging of small airways with thick mucus; collagen deposition beneath the basement membrane; hypertrophy of bronchial smooth muscle; airway edema; mast cell activation; and denudation of airway epithelium. This airway inflammation underlies disease chronicity and contributes to airway hyper-responsivenes and, airflow limitation.[1] The autonomic nervous system controls several aspect of airway function [2]. Any abnormality in autonomic regulation of the airways, therefore, may lead to bronchospasm, airway edema and excessive mucous secretion, which are the event that take place in pathogenesis of airway obstruction in bronchial asthma[3,4]

According to WHO, Between 100 and 150 million people around the globe -- roughly the equivalent of the population of the Russian Federation -- suffer from asthma and this number is rising. World-wide, deaths from this condition have reached over 180,000 annually.[5]

India has an estimated 15-20 million asthmatics and rough estimates indicate a prevalence of between 10% and 15% in 5-11 year old children.[5]

MATERIAL AND METHODS: The present work was undertaken in 50 cases from Gwalior

of bronchial asthma attending medical OPD and indoor of the Department of Medicine, G R Medical College and J.A.Group of Hospitals, Gwalior (M.P.) and they were randomly

selected without any bias of age and sex.

Diagnostic Criteria: Criteria for grading of severity of asthma by clinical & Peak expiratory Flow Rate [PEFR].

Exclusion Criteria:

1. Patient with history suggestive of heart disease, renal disease, liver disease, diabetes mellitus, significant anemia, electrolyte imbalance or resting abnormal ECG was excluded from the study.

2 All medications that can cause orthostatic hypotension or interfere with autonomic function tests e.g. diuretics, antihypertensives, Ca channel blockers, B blockers, TCA, barbiturates, antipsychotics narcotics etc. should be avoided 24 hrs prior to the tests.

Methods: Those persons selected for the study were subjected to a standardized protocol of history, examination and investigations. A thorough history was recorded with special emphasis

on symptoms of autonomic dysfunction. A complete general and systemic examination was carried out and they were specifically examined in detail for signs of autonomic dysfunction employing the standard "Ewing- Clarke" battery of tests for cardiovascular autonomic functions.

Apart from routine investigations of blood hemoglobin, total and differential leukocyte counts, Spirometry (PEFR) was also done All the subjects will be well-informed regarding the above

precautions that need to be taken before performing the tests.

1. Tests for parasympathetic function

(a) **Heart rate response to valsalva Maneuver:** The test was performed by the patient blowing into a mouthpiece connected to a sphygmomanometer maintaining a pressure of 40mm Hg for 15secs while a continuous lead II ECG was recorded. The reflex response in healthy subjects includes tachycardia and peripheral vasoconstriction during the strain, followed by an overshoot in blood pressure and bradycardia after release of strain. The result was expressed as "Valsalva Ratio" which is the ratio of longest R-R interval after the maneuver (reflecting the bradycardia following the release) to the shortest R-R interval during the maneuver (reflecting tachycardia as a result of strain). The normal ratio is >1.21 and a ratio of <1.10 is considered abnormal.

(b) **Heart rate variation during deep breathing:** The patient was asked to sit quietly and breathe deeply at the rate of 6cycles/ min and lead II surface electrocardiogram is recorded throughout the period. The maximum and minimum R-R intervals during each breathing cycle were measured and these were converted into beats/minute. The HRV >15 bpm is considered normal & that <10 bpm is abnormal.

(c) **Immediate Heart rate response to standing:** The test was performed with the patient lying quietly while the heart rate was recorded continuously on an electrocardiograph. The patient was then asked to stand unaided and the point of standing was marked on the electrocardiograph (lead II). Normally an immediate increase in heart rate which is maximal at about 15th beat after starting to stand occurs and it is followed by gradual bradycardia maximal at about 30th beat. This is expressed as 30:15 beat ratio (R-R interval) and is normally >1.04. A value of <1.01 is taken as definite evidence of autonomic

dysfunction.

2. Tests of sympathetic function :

(a) **Blood pressure response to standing:** The blood pressure was measured by a sphygmomanometer while patient was lying down and again immediately after and at 1st and 3rd minutes after standing up. A difference in systolic blood pressure of 30mm Hg is more or less a definite sign of postural hypotension while a fall of 16-29mm Hg is taken as borderline.

(b) **Blood pressure response to sustained handgrip:** The patient was asked to sit in a chair and his resting blood pressure was recorded. He was then asked to maintain 30% of maximum tension on a dynameter for 5 minute. The blood pressure was again recorded before the release of handgrip. The difference in diastolic blood pressure normally is >16mmHg while a rise of <10mmHg is taken as abnormal. The subjects were categorized as: (table 1)

1. Normal: all five tests normal or one borderline.
2. Early involvement: one of the three heart rate tests abnormal or two borderline.
3. Definite involvement: two or more of the heart rate tests abnormal.
4. Severe involvement: two or more of the heart rate tests abnormal plus one or both blood pressure tests abnormal or both borderline.

Observations: Table 1 shows that maximum number of cases i.e. 24(48%) out of 50 had parasympathetic autonomic dysfunction, and 4 cases (8%) had isolated sympathetic dysfunction while 8 cases (16%) were observed with both parasympathetic and sympathetic dysfunction.

Discussion: Involvement of parasympathetic nervous system in asthmatics had been emphasized by the work of other researchers as well. Sharma B et al [6] had 30 asthmatic patients enrolled in his study out of which, 14(46.67%) had pure parasympathetic dysfunction, 12(40%) had both parasympathetic and sympathetic dysfunction and 4(13.33) had isolated

TH PRICILA DEVI et al 2012 [7]also fined in his study that **there is a linkage between the severity of disease and sympathetic abnormality. Patients with less severe disease tend to have less severe abnormality than patients with severe disease.**

CONCLUSION: Present study shows that prevalence of parasympathetic dysfunction is more common than both sympathetic and parasympathetic involvement.

However Sympathetic dysfunction is least common but not negligible. Although both the autonomic systems-the parasympathetic and the sympathetic may play a role in pathophysiology of asthma but also further studies will be necessary to Establish any prognostic implications of asthma and autonomic dysfunction.

Table 1

Autonomic dysfunction	No of cases	Percentage (%)
Parasympathetic dysfunction	24	(48%)
Sympathetic dysfunction	4	(8%)
Both	8	(16%)

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