MATERIAL AND METHODS

The present study is based on cross sectional data collected on 403 (216 males, 187 females) bronchial asthma patients and 347 (158 males, 189 females) normal healthy subjects, ranging in age from 20-70+ years from Hoshiarpur district of Punjab. The criteria for selection of bronchial asthma patients of either sex included that they were already diagnosed with asthma by a physician with two or more symptoms like recurrent wheeze, cough or chest tightness at rest, nocturnal or early morning wheeze, cough, chest tightness and wheeze or cough during exercise. For control sample apparently normal and healthy individuals were taken for study from the district of Hoshiarpur only.

Selected patients and normal subjects were explained the purpose of the study and need of cooperation was emphasized. Before starting the data collection on the subjects, their consent was obtained. The data on asthma subjects have been collected from Civil Hospital, Hoshiarpur and Aggarwal Nursing Home & Chest Clinic, Hoshiarpur. Information was collected from the patients regarding their socio demographic profile and a detailed clinical history regarding duration and severity of disease was also taken. A severity score was assigned to all the patients on the basis of certain characteristics such as frequency of symptoms, presence of nocturnal symptoms, activity limitation, hospital admission in the previous year and history of
previous life threatening exacerbations. Information regarding smoking status was also taken.

**Grouping of data**

The number of subjects studied in various age groups for both patients and controls are presented in table 1.

<table>
<thead>
<tr>
<th>Age groups (yrs)</th>
<th>Patients</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Males</td>
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<tr>
<td></td>
<td>N</td>
<td>Mean age</td>
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<table>
<thead>
<tr>
<th>Age</th>
<th>Males</th>
<th>Mean age</th>
<th>Females</th>
<th>Mean age</th>
<th>Control</th>
<th>Males</th>
<th>Mean age</th>
<th>Females</th>
<th>Mean age</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>15</td>
<td>23.13</td>
<td>31</td>
<td>24.12</td>
<td>31</td>
<td>24.65</td>
<td>29</td>
<td>24.69</td>
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<tr>
<td>30-39</td>
<td>29</td>
<td>35.00</td>
<td>36</td>
<td>33.97</td>
<td>33</td>
<td>34.48</td>
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<td>40-49</td>
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<td>44.27</td>
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<td>43.45</td>
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<td>50-59</td>
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<td>32</td>
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<td>60-69</td>
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<td>18</td>
<td>71.94</td>
<td>15</td>
<td>72.60</td>
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<td>72.60</td>
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<tr>
<td>20-70+</td>
<td>216</td>
<td>54.69</td>
<td>187</td>
<td>46.59</td>
<td>158</td>
<td>44.83</td>
<td>189</td>
<td>44.66</td>
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</table>

Age in years has been obtained from the date of birth, which only younger and educated subjects could recall, whereas in case of older subjects the age had to be ascertained by association of date of birth with some important festival or historical
events or any other relevant incidence relating to individual e.g., age at marriage, age of the first child etc. With this cross-questioning it was possible to ascertain the correct age of the subject.

I. Anthropometric profile: To study anthropometric profile the following anthropometric measurements have been taken on each subject:

1) Weight (kg)

2) Linear Measurements (cm)
   - Height
   - Sitting height
   - Subischial length (stature – sitting height)

3) Circumferences (cm)
   - Chest
   - Waist
   - Hip
   - Upper arm

4) Chest width

5) Skin Folds (mm)
   - Biceps
   - Triceps
   - Subscapular
   - Suprailiac

Standard techniques as given by Tanner et al. (1969) have been followed to take all these measurements. The bilateral measurements have been taken on left hand side of the
subject. The technique followed for taking these measurements is described in appendix I (a). The anthropometric indices were also derived from these measurements:

**Body mass index**

\[
\text{Body mass index (BMI)} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}
\]

On the basis of BMI asthma patients and normal subjects were classified into four groups, which were defined as follows: Under weight (<18.5 kg/ m²), Normal (18.5 - 24.9 kg/m²), overweight (25-29.9 kg/m²) and obese (≥30.0 kg/ m²).

**Waist circumference**

The data have been categorized as per waist circumference. Waist circumference > 90 in men and >80 in women were defined as abdominal obesity using WHO Asia Pacific Guidelines (2000). Waist circumference is an index of deep adipose tissue (Borkanet et al., 1983).

**Waist to hip ratio (WHR)**

Waist to hip ratio is the measure of central pattern of fat distribution. The higher the waist to the hip ratio, the more masculine the pattern of adipose tissue distribution. Both bronchial asthma patients and control subjects were categorized according to waist to hip ratio cut off values i.e. > 0.9 for males and > 0.8 for females using WHO Asia Pacific Prospective Guidelines (2000).

\[
\text{Waist Hip Ratio} = \frac{\text{Waist circumference (cm)}}{\text{Hip circumference (cm)}}
\]
**Body composition**

To estimate body fat and fat free mass, the body density has been estimated with the help of equations devised by Durnin and Womersely (1974) for different age groups. The calculated body density has been converted to body fat with the help of equation given by Brozek et al., 1963. The details of these equations are given in appendix I (b).

**II. Pulmonary Functions**

To study pulmonary functions of asthmatic patients and controls, pulmonary function test (PFT) was performed on all the subjects using Helios-401 electronic spirometer (Recorders and Medicare Systems, Chandigarh) which is a precalibrated and computerized Spirometer. Spirometric parameters recorded for analyses are as follows:

- a) Forced Vital Capacity (FVC)
- b) Forced Expiratory Volume in One Second (FEV1)
- c) FEV1/FVC
- d) Forced Expiratory Flow (FEF) 25%-75%
- e) Peak Expiratory Flow Rate (PEFR)
- f) Forced Expiratory Volume in Three Seconds (FEV3)
- g) FEV3/FVC
- h) Lung age

The details of these parameters and the technique followed to carry out the test are described in appendix II.