Summary & Conclusions
The present study has been undertaken to investigate the biomedical anthropological dimensions of epileptics on the basis of ABO blood groups, ABH secretions, PTC taste sensitivity, different dermatoglyphic features of fingers and palms, clinical/medical, demographic and socio-cultural profiles of the 400 epileptic patients.

**Demographic, socio-cultural and clinical profile**

Majority of the patients (idiopathic - 94% and symptomatic - 88.5%) were educated. Nuclear type of families (67% and 71%) outnumbered the joint families (33% and 29%). No rural - urban differences were observed. 39% of the patients were married. Twenty seven (17.3%) married epileptic women became pregnant and delivered normal children and eight (5.12%) did not become pregnant due to fear of having epileptic child. Three delivered epileptic children (1.92%).

In 81.75% cases, a doctor was consulted within a week on occurrence of a fit. A large number of respondents (95.75%) had not taken any specific precautions. Practices like putting water in the mouth (8.75%), restraining of movements during fits (4%), forcing patient to smell a leather shoe (1.25%), massaging palm/soles (21%), putting a key/spoon in the mouth (1.25%) and religious measures (4.75%) were observed.

6.25% families had concealed the illness. School teachers were informed about the disease by 20.25% parents of epileptic children. 31.75% had informed neighbours. 7.5% had informed their employers. 2.5% families of married epileptics had informed their in-laws before marriage. Traditional healers were consulted by 16% families.
Among epileptic patients, majority of the patients were non-vegetarians (idiopathic - 54%, symptomatic - 64%). Familial occurrence of epilepsy was seen in 14% of idiopathic and 17.5% of symptomatic epileptic patients. The probands had first degree (idiopathic - 9.5%, symptomatic - 12.5%) and second-degree (idiopathic - 3.5%, symptomatic - 5%) affected relatives. Of the precipitating factors, unknown factors constituted the major group (idiopathic - 52.5%, symptomatic - 58.5%).

Seizures seem to have serious impact on the scholastic and vocational abilities of the patients (idiopathic - 66.5%, symptomatic - 62.5%). Loss of memory was observed in 43.5% of idiopathic epileptics and 46% of symptomatic epileptics followed by poor performance (idiopathic - 23%, symptomatic - 16.5%). Psychiatric disorders (idiopathic - 3%, symptomatic - 3%) and behaviour problems (idiopathic - 4%, symptomatic - 4%) were also observed.

Neurological investigations reveal that EEG was normal in 66.5% of idiopathic epileptics and 68.5% of symptomatic epileptics. Computed tomography (CT scan) was normal in all idiopathic epileptics and 8% of symptomatic epileptics. Magnetic resonance imaging (MRI) was abnormal in equal number of patients, i.e., 8.5% each.

**Genetic Markers**

**ABO blood groups**

The results of ABO blood group system revealed a relatively high frequency of the blood group B followed by O, A and AB respectively in both idiopathic and symptomatic epileptics. The control group also showed the similar results.
The relative incidence among idiopathic epileptics was higher in $O$ versus $AB$ (2.44%) phenotypes followed by $A$ versus $AB$ (2.3%) phenotypes and the lowest was for $A$ versus $B$ (0.4%) combination. Symptomatic epileptics also show similar results, though statistically insignificant.

**ABH secretions**

30% of the idiopathic epileptics were non-secretors, while 18% of the symptomatic were non-secretors. The frequency of non-secretors in control group was 37%.

The gene frequency in idiopathic epileptics is : \( Se (0.45) \), and \( se (0.55) \). The gene frequency in symptomatic epileptics is : \( Se (0.82) \) and \( se (0.18) \). The gene frequency in controls is : \( Se (0.39) \), and \( se (0.61) \).

The relative incidence values of ABH secretions for idiopathic epileptics (secretor versus non-secretor) was 1.3703, and for symptomatic epileptics it was (secretor versus non-secretor) + 2.6754. Chi-square test showed significant differences for ABH secretions in idiopathic versus symptomatic (\( p \leq 0.01 \)) and symptomatic versus controls (\( p \leq 0.01 \)) comparisons.

**PTC taste sensitivity**

In the present study, there was no sex differences in the incidence of tasters and non-secretors. In idiopathic epileptics 35.5% individuals with epilepsy were non-tasters, while in the symptomatic group 32.5% individuals were non-tasters. Chi-square test showed significant differences in the frequency distribution for taste thresholds between idiopathic epileptics and controls (\( p \leq 0.01 \)) and between symptomatic
epileptics and controls (p \leq 0.05). The relative incidence values of PTC tasting ability for idiopathic epileptics (taster versus non-taster) was 0.3921 and for symptomatic epileptics (taster versus non-taster) it was 0.5192.

**Dermatoglyphics**

The data for the dermatoglyphic characters comprise of palmar as well as digital variables. These variables consist of both quantitative as well as qualitative variables. These include pattern types on hypothenar region, Thenar +I, II, III, IV interdigital areas; position of axial triradius; atd angle; palmar main lines D, C, B, A terminations; main line index; digital pattern on the finger balls of both the hands; various indices (Furuhata’s index, Dankmeijer’s index, and pattern intensity index) and certain features related to palmar triradii, i.e., presence of accessory triradius a and d, presence/missing of triradius c, bilateral asymmetry. The findings are summarized below:

**Finger ball patterns**

**Frequency distribution**

Loop was the most frequently occurring pattern type in epileptic patients (idiopathic – 50.65%, symptomatic – 52.0%), and controls (50.90%). Out of which, ulnar loops showed a preponderance over other patterns in epileptic patients (idiopathic – 49.15%, symptomatic – 43.15%) and controls (49.40%). However, arches occured more frequently (7.90%) in controls than among the epileptic patients (idiopathic – 5.60%, symptomatic – 6.90%). On the whole, statistically significant differences (p \leq 0.05) were found between epileptic patients and controls for various
finger ball patterns, e.g., idiopathic versus symptomatic (p <0.05) for digit I and V, idiopathic versus controls (p <0.01) for digit I, IV and V and symptomatic versus controls (p <0.01) for digit IV.

**Palmar traits**

**Axial triradius**

Axial triradius was more proximally placed (t position) in epileptics (idiopathic – 71%, symptomatic – 67.75%) as compared to controls (44.50%). The differences were statistically significant.

**Palmar patterns**

Arch / open field pattern types predominated on hypothenar area in epileptic patients (idiopathic – 73%, symptomatic – 74%) and controls (77%), open field on Th+1 area in epileptic patients (idiopathic – 91.5%, symptomatic – 93.75%) and controls (94.5%). Open fields predominate on II\textsuperscript{nd} interdigital area in epileptic patients (idiopathic – 93%, symptomatic – 95.25%) and controls (91%), open field predominates in III\textsuperscript{rd} interdigital group in epileptic patients (idiopathic – 63.5% and symptomatic – 58.50%) and controls (68.5%). Open field also predominates in II\textsuperscript{nd} interdigital area of epileptic patients (idiopathic – 53.25% and symptomatic – 57.25%) and controls (61%).

**Interdigital ridge count**

Means of inter-digital ridge counts (a-b, b-c, c-d) of epileptic patients were lower than that of controls. The intergroup differences were statistically significant.
Terminations of main lines D & A

The main line D showed a greater tendency to terminate at position 11 in symptomatic epileptics (53.75%) than idiopathic epileptics (47.75%) and controls (44%). D line termination at position 9 showed the highest frequency in the controls (39.5%) and the lowest in the symptomatic epileptics (28.25%). The chi-square tests were found to be statistically significant in the three sets of comparisons.

Termination of main line A recorded the highest frequency of termination at position 5’ in epileptic patients as well as controls, though there are differences in the magnitude (idiopathic - 40.25%, symptomatic - 43.0% and controls - 45.5%). The chi-square tests were statistically significant in the three sets of comparisons.

Palmar main line index

Mean main line index were higher on the right palm (idiopathic - 9.07, symptomatic - 9.13 and controls - 9.17) as compared to the left palm (idiopathic - 8.88, symptomatic - 8.38 and controls - 8.66) among epileptic patients and controls. However, t tests showed statistically insignificant differences.

Maximal $atd$ angles

The mean value of $atd$ angles was found to be: idiopathic (40.77±7.40), symptomatic (40.64±7.33), and controls (40.94±7.83). The values of $atd$ angles showed statistically insignificant differences.
Absence of c triradius

Idiopathic epileptics (3.5%) and controls (4%) almost showed equal frequency of absence of c triradius, while the symptomatic epileptics showed the lowest frequency (1.5%). The differences were statistically not significant.

Accessory (a & d) triradii

The accessory a triradius was present in 5.50% idiopathic epileptics, 6.75% in symptomatic epileptics and 5.50% in controls. Accessory d triradius was present in 15.75% idiopathic epileptics, 13.75% symptomatic epileptics and 14.50% in controls. Statistically insignificant differences were observed.

Palmar creases

The prevalence of simian crease was in fact slightly lower among epileptics than controls.

In epileptic patients and controls proximal double radial base type of transverse crease (idiopathic - 70.75%, symptomatic - 67% and controls - 58.50%) showed the maximum frequency, while the single radial base type (idiopathic - 2%, symptomatic - 0.75% and controls - 3%) showed the minimum frequency.

Frequency of double carpal base longitudinal creases was lower among epileptics (idiopathic - 19%, symptomatic - 26.75%) than controls (65%).
Bilateral asymmetry in palmar traits

a) Directional asymmetry

The \( b-c \) ridge count displayed the highest rate of directional asymmetry for palmar traits in idiopathic epileptics, while it was so for the \( a-b \) ridge count in symptomatic epileptics, and \( c-d \) ridge count in controls. All \( t \) tests for various comparisons were insignificant.

b) Absolute asymmetry

Absolute asymmetry was lower in epileptics than controls and the differences were significant for absolute asymmetry in \( a, b \) ridge counts.

Dermatoglyphic Indices

Indices of bilateral asymmetry of fingers and intraindividual diversity

Mean asymmetry and diversity values were higher in symptomatic epileptics as compared to idiopathic epileptics. But controls showed the highest value as compared to epileptic patients. Only \( A_2 \) in idiopathic versus symptomatic comparison showed statistically significant difference.

a) Directional asymmetry

There was no definite patterns for magnitude of directional asymmetry of finger ridge counts and \( t \) tests were also insignificant.

b) Absolute asymmetry

The first and fourth fingers displayed the highest rate of absolute asymmetry for ulnar counts in epileptic patients (idiopathic and
symptomatic) as well as controls, while absolute asymmetry for radial count was the most pronounced on the second finger in idiopathic and symptomatic epileptics and fourth finger in controls. However, t values showed insignificant differences.

**Furuhata’s index**

The value of Furuhata’s index was higher in idiopathic epileptics (84.75%) as compared to symptomatic epileptics (77.98%), and controls (79.96%) indicating the high occurrence of whorls as compared to loops.

**Dankmeijer’s Index**

Low value of Dankmeijer’s index in the patients (idiopathic - 10.94%, symptomatic - 13.26%) as compared to controls (15.52%) indicates a low frequency of arches in patients.

**Pattern intensity index**

The value of pattern intensity index was higher in patients (idiopathic - 11.55%, symptomatic - 12.45%) as compared to controls (6.61%) indicating the number of triradii to be higher in the epileptic patients.

**Discriminant function analysis**

The discriminant function analysis of the finger ball pattern scores and ridge counts was performed to study the traits which could discriminante the three groups.

The stepwise discriminant analysis of the finger ball dermatoglyphic scores and ridge counts of the right hand revealed that
only 6 of the 15 variables were useful discriminants. Two discriminant functions were generated. The eigenvalue for the function 1 was 0.256 which explained 94% of the variance. Function 2 had the eigenvalue of 0.016. The canonical correlation for function 1 was 0.45, while for function 2, it was 0.13. The standardized co-efficients for function revealed that URC 5 made the greatest contribution to the function 1, while score 1 made the greatest contribution to function.

The stepwise discriminant analysis of the finger ball dermatoglyphic scores and ridge counts of the left hand revealed that only 5 of 15 variables were useful discriminants. Two discriminant functions were generated. The eigenvalue for the function 1 was 0.171, which explained 98% of the variance, while the second function only explained 2% variance.

The variable score 4 had the highest standardized canonical discriminant function co-efficient for the function 1. The standardized co-efficients for function revealed that RRC made the greatest contribution to the function 2.

The plotting of group centroids of the three groups for discriminant functions reveal supportive group centroids. The results of the present study, clearly revealed that computer aided diagnosis of idiopathic and symptomatic epileptics is possible with the help of a large battery of dermatoglyphic variables. Hence, dermatoglyphics can become an important tool in the field of medicine to diagnose various types of epileptic patients.