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ORIGINAL ARTICLE

Facial Soft Tissue Thickness measurement in Adult Population- A retrospective study

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ABSTRACT:
Background: Several factors are responsible for determining the facial profile of an individual including the facial soft tissue thickness (FSTT) and the dental and skeletal characteristics. The present study was conducted to assess facial Soft tissue thickness in adult population. **Material & Methods:** The present study was conducted among 30 patients CT images to assess facial soft tissue thickness adult population. Measurements were taken with the image tool of the DICOM software in personal laptop. For this study, seven biometric landmarks were identified and tissue depth at each of these landmarks was measured on the CT scans. The mean and standard deviation were calculated for each measurement. The mean of each value is compared gender-wise. p value ≤0.005 considered significant. **Results:** In the present study 30 patients CT images were included and divided according to gender. 50% were males and 50% were females. The p-values indicate that not all coefficients have a significant impact on tissue depth. They indicate that in gender-wise comparison the landmark A (end point of nose), F (suborbital) is highly significant. In females soft tissue depth values at point A and F are less than values in males. **Conclusion:** In females soft tissue depth values at point A and F are less than values in males. So, it can be concluded that Soft tissue thickness values help in facial reconstruction and also help in forensic identification of an individual.
Keywords: Facial soft tissue thickness, forensic identification, CT scans.

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INTRODUCTION

Facial Reconstruction is most usefully applied in cases where human remains have no attributable identity because it allows one to recreate the face of an individual by reconstructing the contours of the skull's soft tissues; this increases the likelihood of facial recognition. Different methodologies have been developed in three-dimensional Facial Reconstruction including computer programs that can generate an image of a face using the anatomical relationship between soft tissue and the skull.[1] Traditional 'plastic' methods apply modeling clay or plasticine on a cast of the skull, approximating the estimated tissue depths at the landmarks and interpolating in between. Current computerized techniques mimic this landmark interpolation procedure using a single static facial surface template.[2] it has been reported that the average individual rarely maintains a constant weight and is therefore difficult to collect subjects with constant weight to height ratio. A small variation in weight is generally dispersed throughout the body and does not necessarily reflect in the face. The factors constituting likeness are more dependent on proportions than on finite measurements and so are not destroyed by a small variation in weight .[3] The present study was conducted to assess facial Soft tissue thickness in adult population.

MATERIAL & METHODS

The present study was conducted among 30 patients CT images to assess facial soft tissue thickness adult population. Before the commencement of the study ethical clearance was taken from the Ethical Committee of the institute. CT scan data was collected department of general radiology. Patients with head trauma, fractures, swellings, asymmetries, distortions, malformations or any abnormality that can influence the shape of the face or thickness of subcutaneous musculature, were excluded from the study. Measurements were taken with the image tool of the DICOM software in personal laptop. The method of soft tissue thickness measurement was similar to that described by Aulsebrooket al[4] and was established as follows: A tangential line was drawn to the curve of the outer surface of the body landmarks. A line was drawn perpendicular to the tangent at the bony landmark and extended outward to meet the facial profile. The length of the line from the bone to the junction with the skin surface was regarded as the equivalent soft tissue thickness at that landmark. Seven facial landmarks on midface that were chosen for this study. For this study, seven biometric landmarks were identified and tissue depth at each of these landmarks was measured on the CT scans. The locations correspond to the osteological landmarks.

All landmarks were measured on axial section. The mean and standard deviation were calculated for each measurement, and these means can future be used for purpose of facial reconstruction. The mean of each value is compared gender-wise. p value ≤0.005 considered significant.

RESULTS

In the present study 30 patients CT images were included and divided according to gender. 50% were males and 50% were females.

Table 1: Facial soft tissue depth means (mm) for adult population according to gender

Landmark	Gender(Mean±SD)		p-value
	Male	Female	
A	13.14±3.08	8.75±1.12	<0.01*
B(right)	6.34±1.78	6.64±1.56	0.439
C(right)	12.56±5.67	13.69±3.56	0.357
D(right)	8.56±1.87	7.89±2.65	0.079
E(right)	2.68±1.13	1.67±0.78	0.838
F(right)	2.56±1.25	1.45±0.87	0.001*
G(right)	6.67±2.56	6.78±3.67	0.979
B(left)	6.67±1.96	6.35±1.94	0.567
C(left)	12.78±5.67	14.04±3.34	0.774
D(left)	8.56±1.69	7.54±2.59	1.456
E(left)	2.87±1.76	3.31±2.09	0.756
F(left)	2.60±1.05	1.65±0.98	3.567
G(left)	6.16±2.56	6.14±3.45	0.005*

The p-values indicate that not all coefficients have a significant impact on tissue depth. They indicate that in gender-wise comparison the landmark A (end point of nose), F (suborbital) is highly significant. In females soft tissue depth values at point A and F are less than values in males.

DISCUSSION

Facial soft tissues play a significant role in forensic science, anthropology, plastic surgery, and in dentistry as they provide basis for quantification and repeatability. The majority of the soft tissue thickness data have originated from lateral cephalograms as observed by Stephan and Simpson in their analytical review.[5]

In the present study 30 patients CT images were included and divided according to gender. 50% were males and 50% were females. The p-values indicate that not all coefficients have a significant impact on tissue depth. They indicate that in gender-wise comparison the landmark A (end point of nose), F (suborbital) is highly significant. In females soft tissue depth values at point A and F are less than values in males.

Monica Domaracki (2006) measured soft tissue thicknesses of an Australian cadaver sample (*N*=33) using published needle puncture techniques at 13 anatomical locations. Data were compared and contrasted with other studies that used essentially identical samples and methods. Full descriptive statistics were calculated for measurements made in this study and means, medians, and modes were reported. Differences between mean values for males and females were found to be minimal (2.2 mm or less) and considerable overlap was found between the groups. There were no statistically significant differences between the soft tissue depths of the sexes (*P*>0.05). These findings indicate that differences between male and female soft tissue depths are of little practical significance for craniofacial identification and, therefore, data (means, standard deviations, and sample sizes) reported for Australians were pooled across the sexes and the studies.[6]

Saxena T et al 2012 found that facial soft tissue thickness values decreased with age. Soft tissue thickness values were less in females than in males, except at ramus region. Comparing the left and right values in individuals it was found to be not significant. The study concluded that soft tissue thickness values are an important factor in facial reconstruction and also help in forensic identification of an individual. CT scan gives a good representation of these values and hence is considered an important tool in facial reconstruction. This study has been conducted in North Indian population and further studies with larger sample size can surely add to the data regarding soft tissue thicknesses.[7]

Chhajed S, et al 2014 found that significant differences were observed in the lateral cephalometric norms between the central Indian and the white samples. Also significant sexual dimorphism was noted between males and females of the central Indian sample.[8]

Sahni D et al 2008 determined at 29 standard anthropological landmarks by magnetic resonance imaging (MRI) in 173 male and 127 female adult subjects of northwest Indian origin. Repeatability and accuracy of the measurements was assessed by paired t-test and 95% confidence intervals. A stepwise discriminant function analysis selected nine landmarks for better sex classification in FSTT measurements. The thickness of soft tissue was different from that described in the literature and

reported for samples from other countries. A correlation between skinfold thickness and body mass index (BMI) with that of FSTT was observed. The data of facial soft tissue thickness will help forensic experts in reconstructing the face from a skull for identification purposes.[9]

CONCLUSION

In females soft tissue depth values at point A and F are less than values in males. So, it can be concluded that Soft tissue thickness values help in facial reconstruction and also help in forensic identification of an individual.

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