Morphometric analysis and sexual dimorphism of corpus callosum: A MRI Study

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Abstract

The aim of the present study was to measure the various dimensions of the Corpus Callosum (CC) in normal adult Indian men and women and to identify gender related differences, if any. Corpus Callosum (CC) is the major anatomical and functional commissure linking the two cerebral hemispheres. It connects cortical as well as subcortical region of the right and left sides of the brain and plays an essential role in the integration of information between the two hemispheres. Variations in size and morphology of Corpus Callosum are elucidated in a wide range of neuropsychiatric disorders [1-5]. Study of difference in shape and size of Corpus Callosum and its subjective association with intelligence and apprehensive ability has engrossed our scientists. Literature hints towards a possible relation between different morphometry of Corpus Callosum with the difference in cognitivity and behavioural pattern seen in males and females. Hence sexual dimorphism of Corpus Callosum is a matter of increasing research. Our study sample comprised 200 subjects (109 males and 91 females) who were referred to Dr. Ram Manohar Lohia Institute of Medical Sciences for head MRIs and were reported to have normal images by the Radiologist. Individuals who were later diagnosed with neurological problems, brain haemorrhage, trauma or neoplasia and those younger than 20 and older than 80 years were excluded. Examination was done in Midsaggital Plane (MSP) which was determined using midpoints of Posterior Commissure, Anterior Commissure, and Inter-hemispheric fissure as described by Mitchell et al., Dimensions of interest were manually traced using SYNAPSE PACS Viewer Software (fujifilm USA, Inc.) on T1 weighted magnetic resonance images which were obtained from GE Healthcare 3.0T MRI Scanners. Clearance from the Institutional Ethics Committee was taken before embarking on the study. The measured dimensions was tested for gender-related differences and measurements were also checked for correlation. STATA Software (STATA Inc.) was used for statistical analysis. Student's t-test, one way ANOVA (Analysis of Variance), linear regression and Pearson correlation coefficient were used to analyse the data. P-values less than 0.05 were considered significant. Statistical analysis of the different corpus callosum parameters was done to compare sexual dimorphism using unpaired student t-test. The mean values of various corpus callosum parameters between the two sexes were compared and corresponding P-values tabulated to see if the difference is statistically significant. We have tried to achieve morphometry of normal CC in different gender groups. Sexual dimorphism though in only certain region is now an evident feature of corpus callosal anatomy. Whether and to what extent these morphological differences are associated with behavioural and cognitive differences between men and women remains unclear. This research would provide reference charts for further studies on neurological diseases affecting corpus callosum and its associated structures.

Biography

Rajan Bhatnagar has completed MBBS MS (Anatomy) AFMC at University of Pune, India. He is Chief Medical Superintendent, professor and head of Department of Dr RMLIMS, Lucknow. He was nominated as one of the four members for bringing about adaptations to Students Edition of Gray's Anatomy 2012. He was awarded as a western air command silver medal for standing first in advanced course (Anatomy) 1996. Become coordinator department of medical education, AFMC from 2004 to 2008. He had been awarded Vice-Chief of Army Staff commendation card in 2008. Replaced the pungent smelling and toxic formalin with a pleasant smelling, nontoxic chemical Phenoxyethanol as a preservative in the Dissection Hall.

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