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Ultra sonographic study of right lobe of liver morphometry with age, sex, height, weight and BMI of individual in central Indian population

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Abstract---Correlation between craniocaudal length of right lobe of liver and age of subjects is not significant at 5% level of significance. Correlation between craniocaudal length of right lobe of liver and gender of subjects is significant at 5% level of significance, ($p=0.00$). Craniocaudal length of right lobe and height of subjects showing +ve correlation and correlation between ccl of rt lobe and height of subjects is significant at 5% level of significance. Craniocaudal length of right lobe and body mass index of subjects showing +ve correlation ($r=0.356$) and correlation between ccl of rt lobe and BMI of subjects is significant at 5% level of significance. Craniocaudal length of right lobe and weight of subjects showing +ve correlation ($r=0.047$) and correlation between ccl of rt lobe and weight of subjects is not significant at 5% level of significance.

Keywords---ultra sonographic, right lobe, liver morphometry.

Introduction

The liver is largest abdominal organ, occupying the upper portion of abdominal cavity. It occupies most of the right hypochondrium and epigastrium, and frequently extends into the left hypochondrium as far as the left anterior axillary line. On the diaphragmatic surface, the liver is divided into two lobes, right and left, by the attachment of the falciform ligament. The right lobe which forms the base of the wedge-shaped liver is approximately six times larger than the left lobe. On the visceral surface, the liver is divided into four lobes: (a) right lobe, (b) left lobe, (c) quadrate lobe, and (d) caudate lobe by fissures and fossae present on this surface (fissures for ligamentum teres and ligamentum venosum, porta hepatis, groove of the IVC and fossa for the gall-bladder). These fissures and fossae form an H-shaped figure. (a) Right lobe to right of the fossa for gallbladder. (b) Left lobe to the left of the fissures for ligamentum teres and ligamentum venosum. (c) Quadrate lobe, between the fossa for gallbladder and the fissure for ligamentum teres below the porta hepatis. (d) Caudate lobe, between the groove for IVC and the fissure for ligamentum venosum above the porta hepatis. As the size of body grows the liver rapidly increases in its size. This period of growth reaches its peak around 18 years and is followed by a gradual decrease in liver weight from middle age.

The liver weight is 4–5% of body weight in infancy and then decreases gradually to approximately 2% in adult. Liver has an overall wedge shape, which is, in part, determined by the form of the upper abdominal cavity into which it grows. The narrow end of the wedge lies towards the left hypochondrium, and the anterior edge points anteriorly and inferiorly. The shape of right lateral aspects and superior aspect are due to the anterolateral abdominal and chest wall, as well as the diaphragm. The inferior aspect is shaped by the surrounding organs.

Aim and objective

To measure morphometry of right lobe of liver by USG and correlate with the age, sex, height weight and BMI.

Materials and Method

This study has been conducted in anatomy department in collaboration with radiodiagnosis department of L. N. medical college, & J.K. Hospital, Kolar road, Bhopal. Craniocaudal length of right lobe of the liver is measured through mid clavicular line. Demographic data such as age and gender of subjects are recorded by designed form and weight and height of subjects are measured through weighing machine and stadiometer respectively. The sample size of this study is 642 normal healthy individuals without any liver disease. USG has been done on model - WIPRO GE (VERSANA PRIMER) 6040878WXO

Inclusion criteria

Age of the subjects are between 18-60 years. Only normal healthy individuals are included in this study, both male and female subjects are included in this study

Exclusion criteria

Those individuals who are suffering from liver disease, diabetes mellitus, renal disease, hypertension, cardiac disorder, alcoholic, obesity, are not included in the study.

Observations And Results

Table 1: Association of CCL of RT lobe with age- groups of subjects under consideration

Age-groups	N	Mean±SD	Sig.Value
20-30	330	11.68±1.36	0.63
31-40	218	11.81±1.39	
41-50	86	11.76±1.56	
51-60	8	12.07±1.12	

*Significant at $\alpha=5\%$

Table-1 showing the association of craniocaudal length of right lobe with age - groups of subjects under consideration. Maximum mean length of ccl of right lobe were found in age group 51-60yrs (12.07±1.12), followed by 11.81±1.39 in the age group 31-40yrs. Mean±SD of ccl of right lobe in the age group 20-30yrs which is having maximum number of subjects were 11.68±1.36 . However no significant difference for ccl of right lobe has been coming out between the age groups considered at 5% level of significance.

Table.2. Association of CCL OF RT lobe with Gender

Gender	N	Mean±SD	Sig.Value
Male	275	12.56±1.15	0.00
Female	367	11.13±1.24	

There were 275 male and 367 female in the study. Mean±SD of ccl of RT lobe of liver of male is 11.13±1.24 while for female it is 12.56±1.15. there is significant difference between male and female at 5% level of significance ($p= 0.00$) for craniocaudal length of right lobe of the liver which has been shown in the table (table.2).

Table.3. Correlation between height and ccl of Rt lobe of subjects under study (N=642)

	Mean	Std. deviation	Corr. Coeff.
Height (cm)	163.492	6.592	-0.09*
CCL Rt Lobe (cm)	11.744	1.398	

*Significant at $\alpha=5\%$

Mean and SD of height of subjects under study were 163.49 and 6.59 respectively. Also mean $\pm$ SD of CCL right lobe of subject was 11.74 $\pm$ 1.39. result showing there is negative correlation between craniocaudal length of right lobe and height of subjects considered under study ($r=-0.09$). Table showing correlation is coming out to be significant at 5% level of significance.

Table.4: Correlation between BMI and CCL Rt Lobe of subjects under study (N=642)

	Mean	Std. deviation	Corr. Coeff.
BMI	23.008	0.895	0.356*
CCL Rt Lobe (cm)	11.744	1.398	

*Significant at $\alpha=5\%$

Mean and SD of Body mass index of subjects under study were 23.008 and 0.895 respectively. Also mean $\pm$ SD of craniocaudal length of right lobe of liver of subjects were 11.74 $\pm$ 1.39. Result showing there is positive correlation between Body mass index of subjects and craniocaudal length of right lobe of the liver considered under study ($r=0.356$). Also table showing correlation is coming out to be significant at 5% level of significance

Table.5: Correlation between Weight and CCL Rt Lobe of subjects under study (N=642)

	Mean	Std. deviation	Corr. Coeff.
Weight (kg)	61.666	6.188	0.047
CCL Rt Lobe (cm)	11.744	1.398	

*Significant at $\alpha=5\%$

Mean and SD of weight of subjects under study were 61.66 and 6.18 respectively. Also mean $\pm$ SD of craniocaudal length of right lobe of the liver of subjects were 11.74 $\pm$ 1.39. Result showing there is positive correlation between weight of subjects and craniocaudal length of right lobe of the liver considered under study ($r=0.047$). Also table showing correlation is not coming out to be significant at 5% level of significance.

Discussion

The result of this study is also same as some study was previously done as a study was conducted by clause niederue in 1983 among 1000 consecutive blood donors and examined by ultrasound . There were 160 women and 840 men between the age of 18-65 years of the age , sex , age , weight , height , body surface area. The result showed that mean value standard deviation and upper normal limit of all the diameters were correlated with the physical parameters . The diameter were smaller in women than in men and demonstrated a positive correlation with height and surface area.

Another study was conducted by Singh K. et al 1985 among 1107 individuals in the age group 8 days to 75 years and the liver span was correlated to height, weight and age. The liver span was independently estimated through radiological examination. The liver span showed significant correlation to height, weight and age. A comparative study was conducted by Kartzar Wolfgang et al 2003 to determine the size of the liver in selected population sample and the potential factors influencing the liver size. A total of 2080 (983 male and 1097 females) underwent ultrasound examination, physical assessment and standardized interview questionnaire. Result of multivariate analysis showed that the factors BMI, body weight, sex, age, exerts an influence over liver size measured at midclavicular line.

A cross sectional study also was conducted by Dhingra B. Sharma S. et al 2009 among 597 healthy children between the ages of 1 month to 12 years. Ultrasonographic evaluation for the assessment of liver and spleen size done. These were correlated with the age, sex, height/length and weight of the participants. Normal liver and spleen length and range were obtained sonographically.

Conclusion

Correlation between craniocaudal length of right lobe of liver and age of subjects is not significant at 5% level of significance. Correlation between craniocaudal length of right lobe of liver and gender of subjects is significant at 5% level of significance, ($p=0.00$). Craniocaudal length of right lobe and height of subjects showing +ve correlation and correlation between ccl of rt lobe and height of subjects is significant at 5% level of significance. Craniocaudal length of right lobe and body mass index of subjects showing +ve correlation ($r=0.356$) and correlation between ccl of rt lobe and BMI of subjects is significant at 5% level of significance. Craniocaudal length of right lobe and weight of subjects showing +ve correlation ($r=0.047$) and correlation between ccl of rt lobe and weight of subjects is not significant at 5% level of significance.

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