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MORPHOMETRIC OF HEPATIC DUCT ANGULATION & RELATIVE PATHOLOGIES INCIDENCE AMONG SUDANESE POPULATION

[1]Rania Ahmed Mohammed F. Almoula, [1]Carloine E. Ayad, [2]Abdurrahman Abdullah Saad Alsayyari, [1]Abdulaziz A. Ahmed and *[1,2]Mohammed Ahmed Ali Omer

[1]College of Medical Radiologic Sciences, Sudan University of Science & Technology – Khartoum Sudan
[2]Department of Radiologic Technology, College of Applied Medical Science, Qassim University-KSA

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ABSTRACT

The morphometric of hepatic ducts angle has been measured and related to some pathologies for the importance of overcoming some further invasive techniques and deducing valuable diagnostic findings. Measurement carried out of contrasted MRI for hepatic ducts angle, gallbladder volume, tumor diameter, stone diameter using ImageJ\ImageJ.exe software program; by drawing two lines running within the origins of both Right and Left hepatic ducts and crossing at biliary confluence angle on coronal oblique images in addition to gender, age, common diagnosis of liver. The results analysis using EXCELL program revealed that: females are more susceptible to GB and liver diseases (57%), hepatic diseases observed at 7-12 years old (1.8%); and peaking at 37-42 years old (20.4%) then decreases following aging. GB diseases implied stone (27.2%), cancer (17.7%), jaundice (15.5%) and PSc (7.7%). The average normal gallbladder volume (GBV) was 22 cm3 relative to hepatic duct angle (45˚), jaundice induced GBV of 36 cm3 relative to (73˚), tumor induced GBV of 68 cm3 relative (84˚) and the stone induced a GBV of 78 cm3 relative to (94˚). The effect of stone and tumor diameters in the hepatic duct angle with significant correlation (R2 = 0.8) in a linear proportional form fitted in the equations: y=0.85x+84 for stones and y=0.81x+65 for tumors; where x refers to stone/tumor diameter in mm and y refers to relative hepatic angle.

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INTRODUCTION

The human liver as one of the huge physiological organs (as well as endocrine organ) with vital Functions (*Metabolic Regulation; carbohydrate metabolism, lipid metabolism, amino acid metabolism, removal of storage of toxins, the synthesis and secretion of bile*)(Frederic *et al.,* 2012). Naturally it could be involved by many diseases; that include (*choledocholithiasis, cholangitis, caroli disease, congenital anomalies, bile duct tumors, primary sclerosing cholangitis* (*PSC*)*, gallbladder carcinoma, pancreatitis, post-surgical anatomy*) (Duchyant and Anthony, 2017).

***Corresponding author: [1,2]Mohammed Ahmed Ali Omer**
[1]College of Medical Radiologic Sciences, Sudan University of Science & Technology – Khartoum Sudan
[2]Department of Radiologic Technology, College of Applied Medical Science, Qassim University-KSA

These diseases in deeds have certain morbidities, mortalities which are impose specific relative signs and symptoms. Ones of such diseases under focus are the hepatic Jaundice, tumors and stones that impose consequences on the hepatic and bile dusts and further on the secretion of bile itself. The morphometric imaging could have certain roles to predict and correlates the impact of pathologies findings (*Jaundice, Tumors and Stones*) on the Gallbladder volume, angle between hepatic ducts, ducts diameters, amount of secretion and the pattern of tissues; which would be of most valuable diagnostic issue and furthers diseases prediction as already confirmed that: dilation of common bile duct diameter is a risk for obstructive and non-obstructive jaundice (Horrow *et al.,* 2001). And dilation of common hepatic bile duct as a risk factor for urethral stones (Grönroos *et al.,* 2001). Relevant to the trend of this study; Jin *et al.,* (2009)have determine the diameter and angulation of the normal common bile duct usingCT, they

revealed that: the average diameter was 6.5 mm and the angulation was 132.6. And as well there was statistically significant correlation between age and common bile duct diameter based on Person correlation analysis for age and diameter resulted in a value 0.415.And the common bile duct (CBD)diameter in people older than 51 years of age showed significant difference compared to the subjects younger than 50 years of age. On the other work related to current study trend done by Nidhi *et al.,* (2014), they determined the CBD diameter as proximal, 4.0 mm (SD 1.02 mm); middle, 4.1 mm (SD 1.01 mm); and distal, 4.2 mm (SD 1.01 mm) and overall mean for all measures 4.1 mm (SD 1.01 mm) with statistical significant relation versus age. While Naseh *et al.,* (2013); measured the CBD diameter as 5/1±2/4mm, 4 5/6±2/mm and 5/9±2/4mm respectively. The influence of gender has been significantly affecting the diameter of CBD in all three sections of proximal, middle and distal as P=0/000, P=0/001, P=0/038) respectively. While Nuray *et al.,* (2009) have showed that: there was no significant correlation between biliary confluence angle and age, gender or body mass index. For the important of anatomical morphometry that could help further in diagnosis and deduction of consequences and morbidities out of noninvasive accurate diagnostic facilities; the trend of this study will focus on the relation of hepatic bile ducts angles and the relative other pathological consequences such as gall bladder volume, stones, tumors, in addition to gender and aging.

MATERIALS AND METHODS

All the examination was done on patients fasting for about 6 hours using MRI Siemens Avanto 2010, strength 1.5 Tesla closed MRI machine with super conductive coil, the selected parameters were, Flip angle(170-180),field of view FOV (100), TR(5122) ms, TE(678)ms, matrix medium 384/348. The applied protocol is single shot fast spin echo(SSFSE)coronal oblique T1 weighted, T2 weighted,T1with gadolinium contrast enhancement image was obtained. The angle was measured using ImageJ\ImageJ.exe software program; by drawing two lines running within the origins of both Right and Left hepatic ducts and crossing at biliary confluence angle on coronal oblique images as shown in Fig. (1-2).

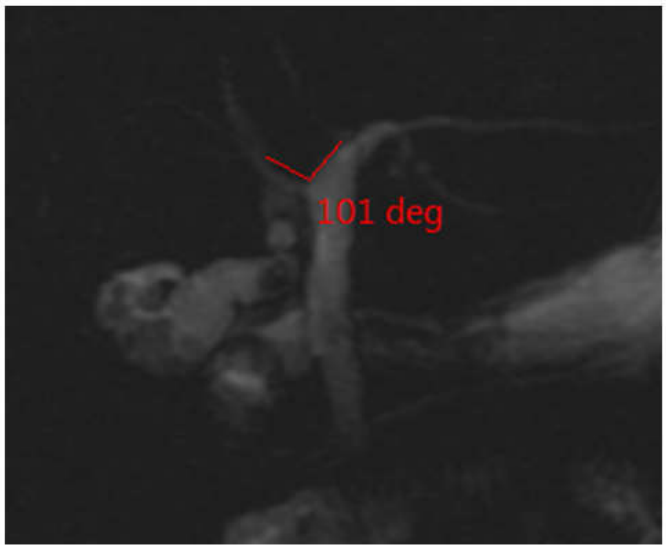

Fig. 1. Shows the (MRCP) image of patient with the hepatic duct angle measured as 101˚

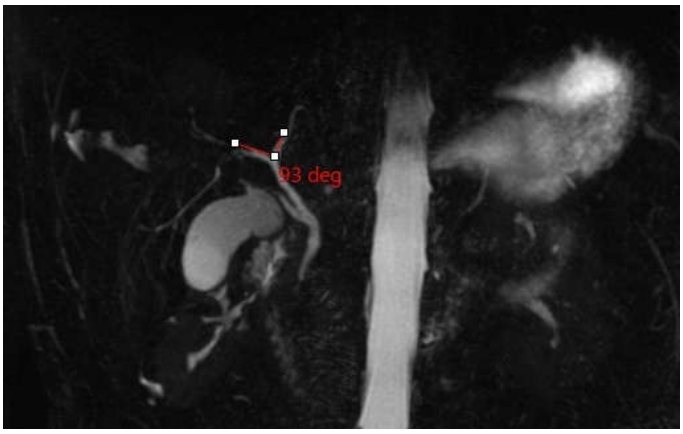

Fig. 2. Shows the hepatic duct confluence angle measured 93˚ for a cancer patient case

The GB volume was calculated from ellipsoid equation stated by Idris *et al.,* (2016); Van *et al.,* (1996) as:

$$GBV = Width \times Length \times Height$$

The study population was drawn from the patients referred to MRCP between 2016 and 2018 for variousdiseases (*jaundice, cancer, stone, Primary Sclerosing Cholangitis (PSC), fatty liver*).A total of 155 patients (66men and 89 women).The confluence angle was measured on coronal oblique thick collimation images where the angle is optimum and the mean values were noted.

RESULTS & DISCUSSION

As has been highlighted in introduction; the common Gall bladder (GB) diseases have been noted among population with relation to many risk factors. The current study distributes the population involved by liver diseases i.e. male and female frequency% (Fig. 3); as a fact the highlighting of diseases correlation to gender could contributes in the new trend of medicine such as gender medicine that depends on (*anatomic and physiological stages, from biological, functional, psychological, social and cultural points of view and analyzes the range of responses to pharmacological care*) (Baggio *et al.,* 2013; Floreani *et al.,* 2011). Here the female showed more frequency 57% involved by liver diseases than male; such result could be ascribed to susceptibility of female to toxicity of general intake (Jennifer and Marion, 2013). Also due to morphological differences in hepatic structure between genders that could influence the severity of hepatic damage among genders (Floreani *et al.,* 2011).As well the aging has an impact on the frequency% of the hepatic diseases; as shown in (Figure4); the frequency% of hepatic diseases observed at 7-12 years old with low percentage (1.8%); however, it increases rapidly following aging and peaking at 37-42 years old (20.4%) then decreases rapidly among both gender. The GB diseases implied many types according to predisposing factors; with some prominent types such as: stone (27.7%), cancer (17.7%), jaundice (15.5%) and PSc (7.7%) with some other rare diseases (Fig. 5). The facts on which such diseases striking the GB prominently and increasing could be ascribed to gender factors, and the types of food intakes and habits. This result has been agreed with the study done by Idris *et al.,* (2016). Volumetric of GB and hepatic duct angle relative to specific diagnosis also, could reveal potential further diagnosis and deduce certain consequences; hence from (Fig. 6) and based on MRI scan; the normal average gallbladder volume

(GBV) was 22 cm^3 relative to hepatic duct angle (45˚), jaundice induced GBV of 36 cm^3 relative to (73˚), tumor induced GBV of 68 cm^3 relative (84˚) and the stone induced a GBV of 78 cm^3 relative to (94˚).

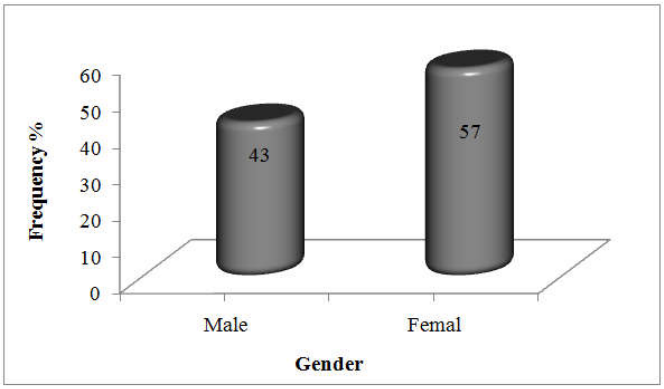

Fig. 3. Shows the gallbladder disease frequency % distributed based on gender

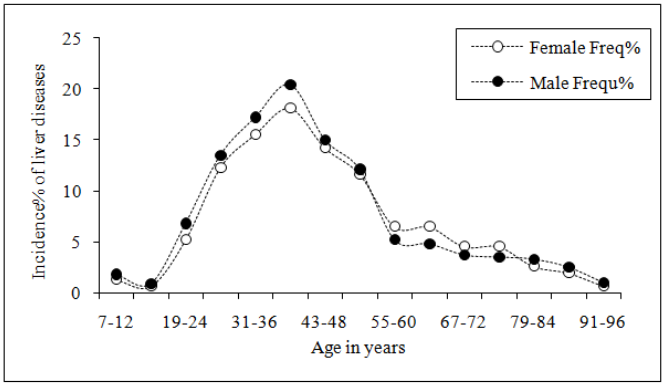

Fig. 4. Shows the age groups and the relative frequency % for the patient with gallbladder disease

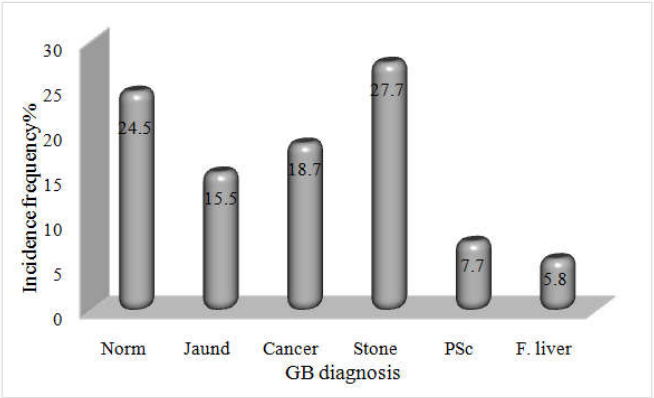

Fig. 5. Shows the common diagnosis of liver and their relative frequency% among the population

These relations could be ascribed to thinning of common hepatic duct wall and pressure induced by angulation that further may influencing the common bile duct causing obstructive and nonobstructive jaundice and dilatation of common hepatic bile duct which are considered as risk factor for urethral stone (Horrow *et al.,* 2001; Grönroos *et al.,* 2001). The tumors and stones diameters originated in the GB could induce serious effects in the flow and secretion of bile and hepatic duct morphology; from such fact; Fig. (7) revealed the effect of stone and tumor diameters in the hepatic duct angle with significant correlation (R^2 = 0.8) in a linear proportional form fitted in the equations: $y = 0.85x + 84$ for stones and $y = 0.81x + 65$ for tumors; where x refers to stone/tumor diameter in mm and y refers to relative hepatic angle.

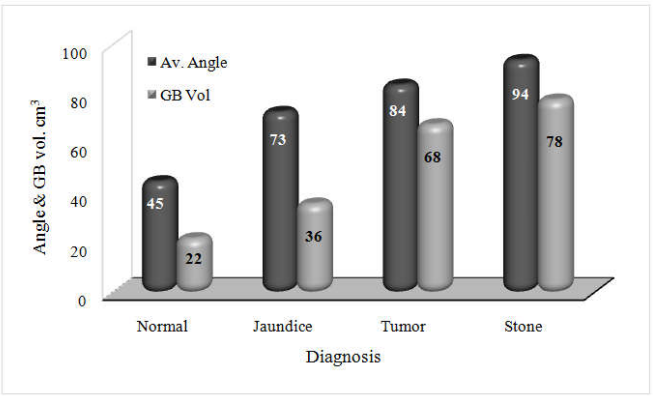

Fig. 6. Shows the common diagnosis of gallbladder with the relative volume and hepatic duct angles on the sample

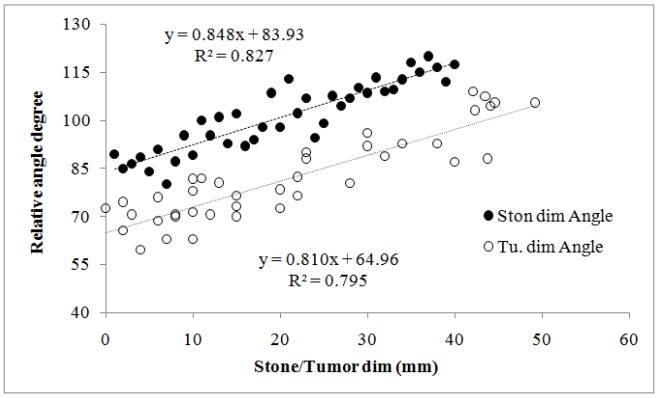

Fig. 7. Shows the correlation between the tumor/stone diameter and the relative hepatic ducts angle

Conclusion

Morphometric studies using non-invasive techniques and less hazards imaging facilities showed great and valuable deduction and diagnostic findings that could overcome more financial expenditure and consequences of hazardous imaging tools.

REFERENCES

Baggio G, Corsini A, Floreani A, Giannini S, Zagonel V. 2013. Review Gender medicine: a task for the third millennium. Clin Chem Lab Med.; 51(4): 713-27.

Floreani A, Cazzagon N, Boemo DG, Baldovin T, Baldo V, Egoue J, Antoniazzi S, Minola E. 2011. Female patients in fertile age with chronic hepatitis C, easy genotype, and persistently normal transaminases have a 100% chance to reach a sustained virological response. *Eur J Gastroenterol Hepatol*; 23: 997-1003.

Frederic H. Martini, Judi L. Nath and Edwin F. Bartholomew. 2012. Fundamentals of anatomy & physiology Pearson Education - San Francisco.

Ghodratollah Naseh, Mahyar Mohmmadifar, Gholamreza Sharifzadeh Seyed Ali Javadinia, Milad Mirzaian, Amin Saburi. 2013. Common bile duct Diameter and Addiction-

International journal of travel medicine and global Health. 1(3): 119-124.

Grönroos JM, Haapamäki MM, Gullichsen R. 2001. Effect of the diameter of the common bile duct on the incidence of bile duct stones in patients with recurrent attacks of right epigastric pain after cholecystectomy. *European Journal of Surgery.*167(10): 767-769.

Horrow MM, Horrow JC, Niakosari A, Kirby CL, Rosenberg HK. 2001. Is Age Associated with Size of Adult Extrahepatic Bile Duct: Sonographic Study1. Radiology. 221(2): 411-414.

Idris N, Idris SK, Saleh MK, Suwaid MA, Tabari AM, Isyaku K, *et al*. 2016. Sonographic measurement of fasting gallbladder volume in healthy adults in North-West, Nigeria. *Niger J Basic Clin Sci.;* 13: 23-29.

Jennifer Guy, and Marion G. Peters. 2013. Liver Disease in Women: The Influence of Gender on Epidemiology, Natural History, and Patient Outcomes. Gastroenterol Hepatol. (N Y); 9(10): 633–639.

Jin-Seok Park, Don Haeng Lee, Seok Jeong, and Soon GU Cho. 2009. Determination of Diameter and Angulations of the Normal Common Bile Duct using Multidetector Computed Tomography. Korea. 3(4): 306-310.

Nidhi Lal, SimmiMehra, and Vivek Lal. 2014. Ultrasonographic Measurement of Normal Common Bile Duct Diameter and its Correlation with Age, Sex and Anthropometry. *J. Clin Diagn Res.* 8(12): AC01-AC04.Doi: 10.7860/JCDR/2014/8738.5232.

NurayHaliloğlu, Ayşe Erden, İlhanErden. 2009. Normal Biliary Confluence Angle in Classical Junction Type: Assessment with MR Cholangiopancreatography. Ankara -Universities TıpFakültesiMecmuası, 62(4).

PMID: 21915057 DOI: 10.1097/MEG.0b013e32834ae863

Sahani Dushyant V. and Anthony E. Samir. 2017. Abdominal Imaging, second edition; Elsevier Philadelphia – PA.

Tom Chen, Ching Ruei Hung, Ay Chiao Huang, Jiunn – Ming LII. Ran Chou Chen. 2012. The diameter of the common bile duct in an asymptomatic Taiwanese population: Measurement by magnetic resonance Cholangio-pancreatography. *Journal of Chinese Medical Association* (75): 384-388.

Van de Meeberg PC, Portincasa P, Wolfhagen FH, van Erpecum KJ, Van Berge-Henegouwen GP. 1996. Increased gall bladder volume in primary sclerosing cholangitis. Gut; 39: 594-599.

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