MORPHOMETRIC STUDY OF GALL BLADDER IN SOUTH INDIAN POPULATION (CADAVERIC STUDY)

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ABSTRACT

78 non-pathological Gall Bladders were studied morphometrically. The length and breadth of GB was measured. The measurements were taken by measuring Tape. Morphologically Normal (Pyriform) GBs were 53.2%, cylindrical 11.4%, oval shaped 11.4%, partially intra hepatic 5.1 %, intra hepatic 3.8%, hour glass 6.3%, Phrygian cap 3.8%, double GB 1.3%, left sided 2.5%. Metrically length and breadth of GB was highly significant ($p<0.01$). This study will certainly help anatomists, anthropologists and medico legal experts to compare the south Indian GB parameters with that of other parts of the country and abroad. Moreover to radiologists to differentiate Reidel's lobe of the liver with variations of the gall bladder and laparoscopic surgeons during cholecystectomy.

Key Words: *GB= Gall Bladder, 2- South India, 3- Variations, 4-Morphological*

INTRODUCTION

It was a belief that Gall bladder(GB) diseases were quite common in the short stature, broad faced and asthenic population.[1] Hence attempt is made to study the morphometry of GB because this institution is in South India and majority of the people are short statured with black complexion and are presumed as of Dravidian race and North Indians are presumed as Aryan race. [2]

The parameters of the GB given in standard text books belong to European population; hence an attempt is made here to measure the parameters of GB of South Indian population. The exact capacity of the GB cannot be measured as it may expand 50 times its original volume. [3]

MATERIALS AND METHODS

The study was undertaken in the Adichunchangiri Institute of Medical Sciences, B.G. NAGAR and Mysore Medical research Institute, Mysore for the period of three months during the year 2013.

A total of 78 GB were studied. 38 were from the dissection theatre of AIMS which was preserved in the cooler. 40 were studied from Department of Anatomy, Government Medical College, Mysore. Photographs of the variations of GB were taken. The length and breadth were measured by measuring tape (tailor's tape). Statistically, t-test was applied for comparison. The data were analyzed by using SPSS 13 for windows 7.

OBSERVATION AND RESULTS

Table No1: Shows Morphological classification of GB, with percentage and graphs. Incidence of normal GB was 53.2%, oval shaped was 11.4%, cylindrical 11.4%, hour glass shaped 6.3%, partially intrahepatic 5.1%, intrahepatic 3.8%, Phrygian cap 3.8%, left GB 2.5%, double GB 1.5%.

Table No 1: Morphological classification of GB

PARTICULARS	INCIDENCE	PERCENTAGE
normal	42	53.2
oval shaped	9	11.4
cylindrical	9	11.4
hour glass shaped	5	6.3
partially intrahepatic	4	5.1
intrahepatic	3	3.8
phrygian cap	3	3.8
left GB	2	2.5
double GB	1	1.3
	78	98.8

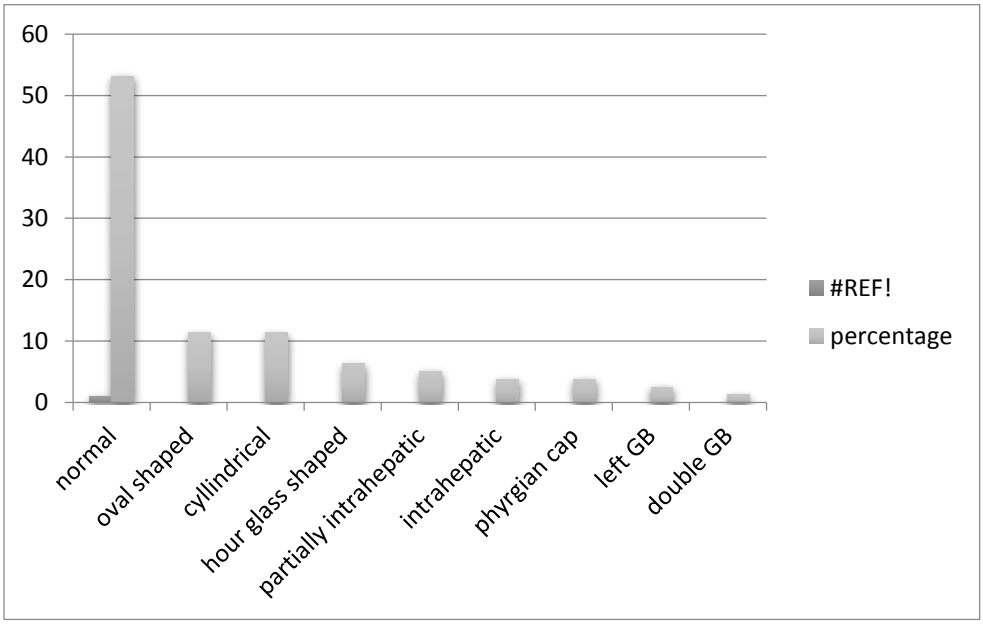


Table No 2 – The present morphometric study was compared with previous workers of India and abroad. And the present study is more or less in agreement with previous workers.

Table no-2: Comparison of present morphometric study of GB with previous workers

SL. NO	NAME OF THE WORKER	YEAR OF STUDY	PLACE OF STUDY	MAX LENGTH (CMS)	MAX.BREADTH (CMS)	SHAPE WITH PERCENTAGE	%
1	LEE MC GREGAR etal	1986	SOUTH AFRICA	7.5-10			
2	TURNER & FULCHER	2000	USA	10	3.5	ELLIPTICAL	
3	MOORE & DAILEY	2006	USA	7.0-10		PEAR SHAPED	
4	CFHARI & SHAW	2008	USA	7.0-10	2.5	PEAR SHAPED	
5	VAKIL & POMFRET	2008	NORTH AMERICA	7.0-10	4	PIRIFOM	
6	STRANDING	2008	LONDON	7.0-10		FLASK SHAPED	
7	JABA RAJGURU, SATYAM KHASE et al	2012	NORTH INDIA	5.0-12	2.5-5	NORMAL GB	85
						FLASK SHAPED	5
						CYLINDRICAL	3.33
						HOUR GLASS	1.67
8	PRESENT STUDY	2013	SOUTH INDIA	4.0-11	2.5-5	NORMAL	53.2
						OVAL GB	11.4
						CYLLINDRICAL	11.4
						HOUR GLASS	6.3
						PARTIALLY INTRAHEPATIC	5.1
						INTRAHEPATIC	3.8
						PHYRIGEAN	3.8
						LEFT GB	2.5
						DOUBLE GB	1.3

Above mentioned metrical values are more or less in agreement with present metrical study

Table No 3 – Comparative study of length and breadth of GB by ANOVA (t) test which is highly significant ($p < 0.01$).

Table 3: Comparison between length and breadth of GB

PARTICULARS			Sum of Squares	df	Mean Square	t value	p value
GBL * GBB	Between Groups	(Combined)	10799.65	30	359.988	2.825	0.001
	Within Groups		5989.338	47	127.433		Highly significant
	Total		16788.99	77			

GBB = GB breadth, GBL = GB length.

DISCUSSION

In the present study (**Table No 1**) the normal shape of GB was 53.2% and oval GB was 11.4% (Figure 1), cylindrical GB 11.4% (Figure 2), Hourglass GB was 6.3% (Figure 3), partially intra hepatic GB 5.1% (Fig–7), intrahepatic GB (Fig-4) 3.8 %, phrygian cap GB 3.8%,(Fig-5) left GB 2.5%, double GB 1.3%. (Fig-6) It was also noted that during fetal life, GB is entirely intrahepatic. [3] 2 % left GB was observed in North India.[4] 2% double GB and 3% intrahepatic GB was also observed in Western India. [5][6]85% normal GB was also reported in North India.[7] The present study was compared with previous workers of India and abroad (**Table No 2)**. There is no exact known cause to define these variations but following are the probable reasons. A) As contraction of GB and secretions of bile are under activation of cholecystokinin and secretin hormones which are released from adreno-axis of pituitary gland, maturations of functional activity of liver depends on adreno-axis of pituitary. Hence role of pituitary may be responsible for these variations. [8] B) Microscopically, there is no muscularis mucosa in GB rather there is a muscularis lamina consisting of irregular anastomosing bundles of smooth muscles running in longitudinal, circular and oblique directions, moreover concentration of

bile solely depends on the ability of epithelium which withdraws water and inorganic ions from the bile. The height of the cells of the epithelium is quite variable to respond to the degree of contraction of bile. [8] Hence indefinite muscular framework might have resulted into variations of shape and size of the GB. C) The plasticity of hepatic parenchyma is observed in fetal life as it does not develop completely until several years after birth but with proliferation of hepatic parenchyma there is an increase in the size and shape of the GB, cystic duct and common bile duct hence there is a mutual or reciprocal relation between GB and functional liver as pars cystica is a spurt of pars hepatica [9]. Hence delay in proliferation or plasticity of hepatic parenchyma might result in Variations of morphometricity of GB. D). As there is an intimate relation between germ layers, fate or destiny of Anatomy of any gland or organ is difficult to predict, especially in the secondary mesoderm which undergoes such an intimate differentiation that it is hardly possible to follow.[10] Hence it clearly indicates that these variations of the GB resulted in response to the functional need of the body. In the metrical study, length and breadth of GB is highly significant ($p<0.01$) **(Table No 3)**. The present study of length and breadth of GB is in agreement with previous studies [11] [12] **(Table No 2).** This certainly indicates that there was a migration of the different races to India for the sake of survival [13]. Because when India was in Glory, Europe was in darkness. Apart from this, genetic signaling requires proper nutrition because each hormone or enzyme is regulated by each gene. [14] Nutritional [15], ecological or environmental factors also play a contributory role for deciding the morphometricity of any gland. Anthropologists or anatomists still have much to learn about the relative roles of genetic and direct environmental influences on the variations in the size and shape of glands in humans because humans have developed from the interaction between hereditary and environment.

Figure 1

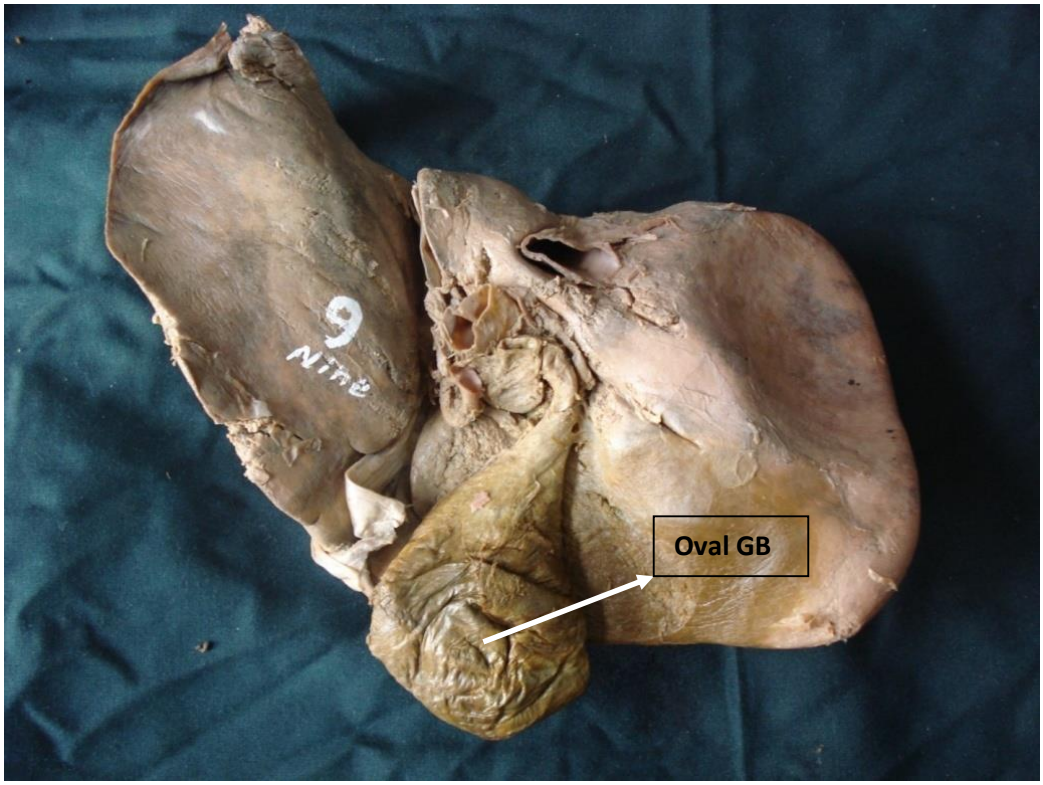


Figure 2

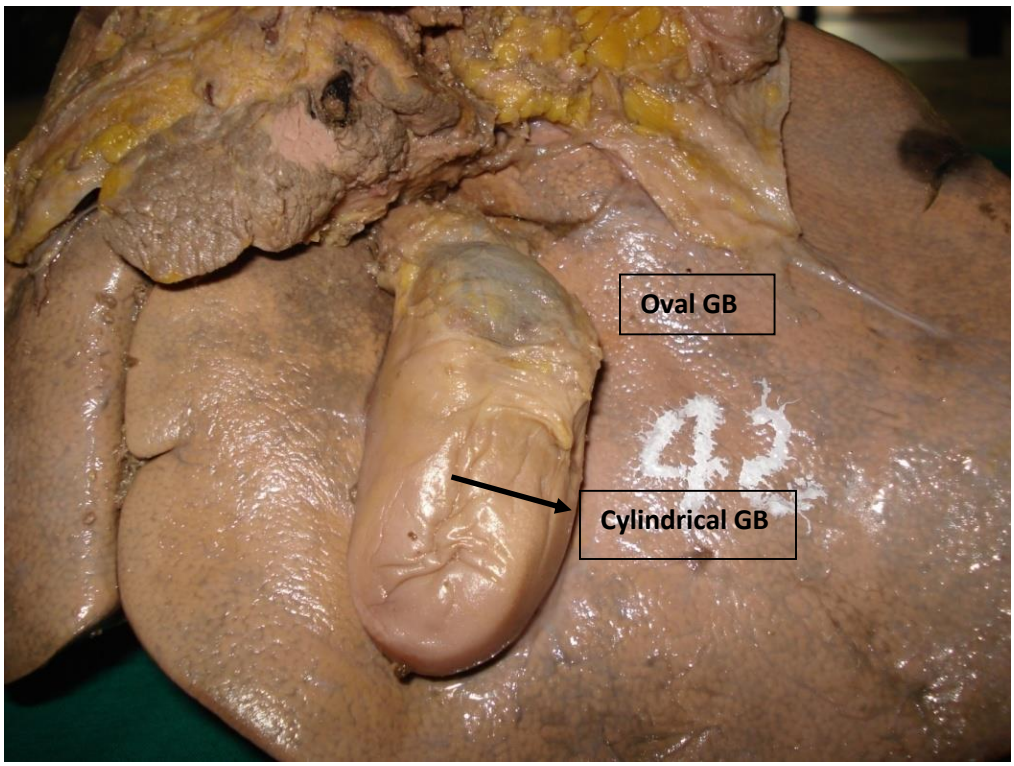


Figure 3

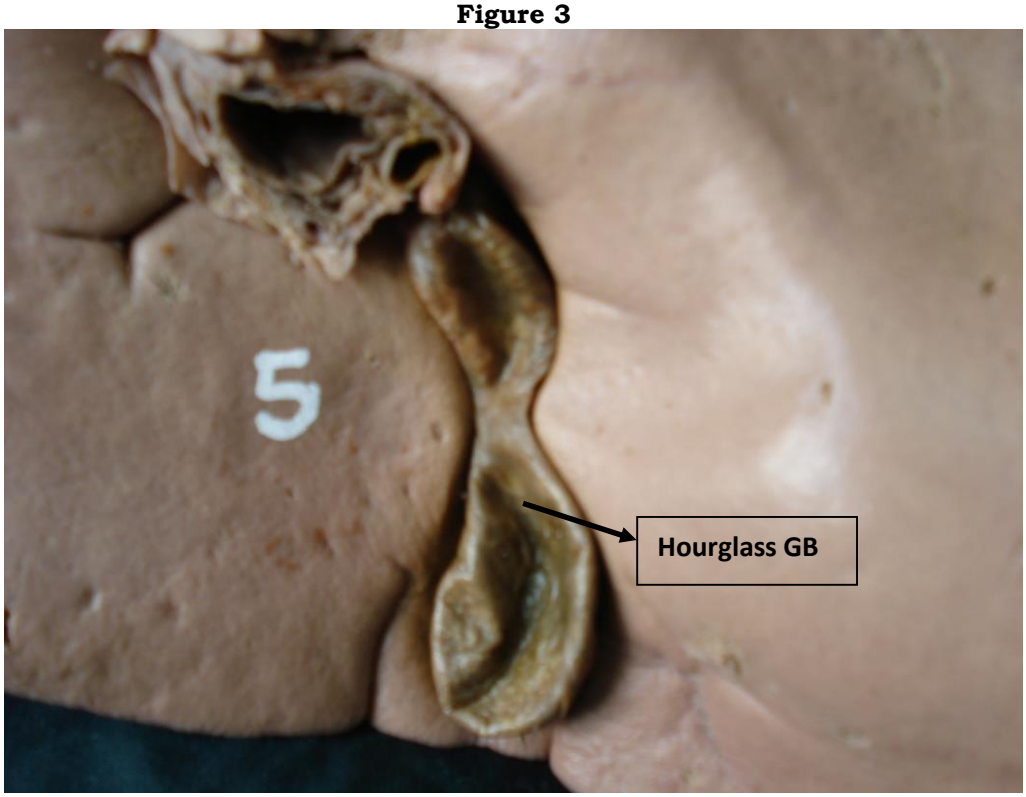


Figure 4

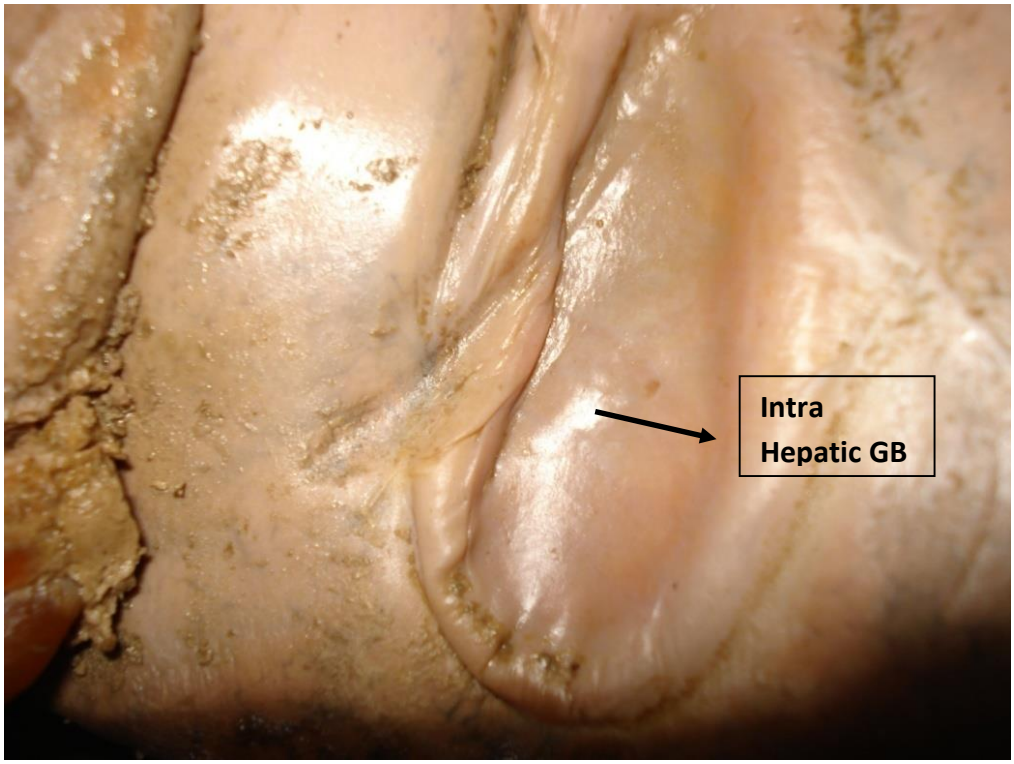


Figure 5

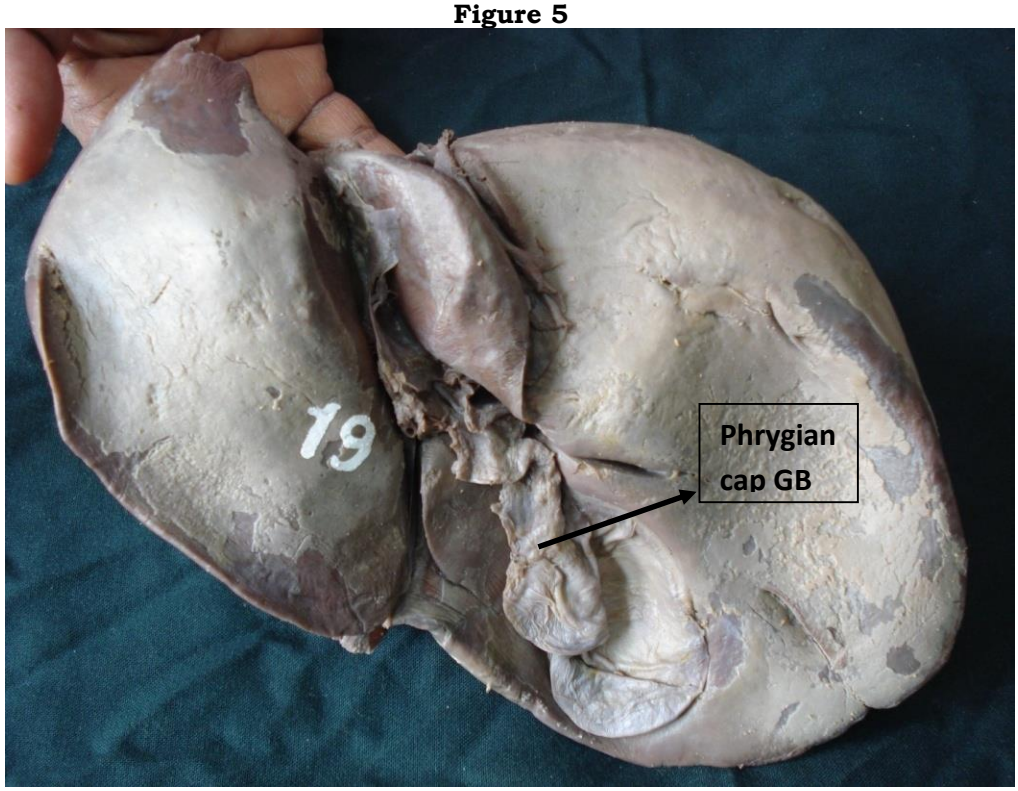


Figure 6

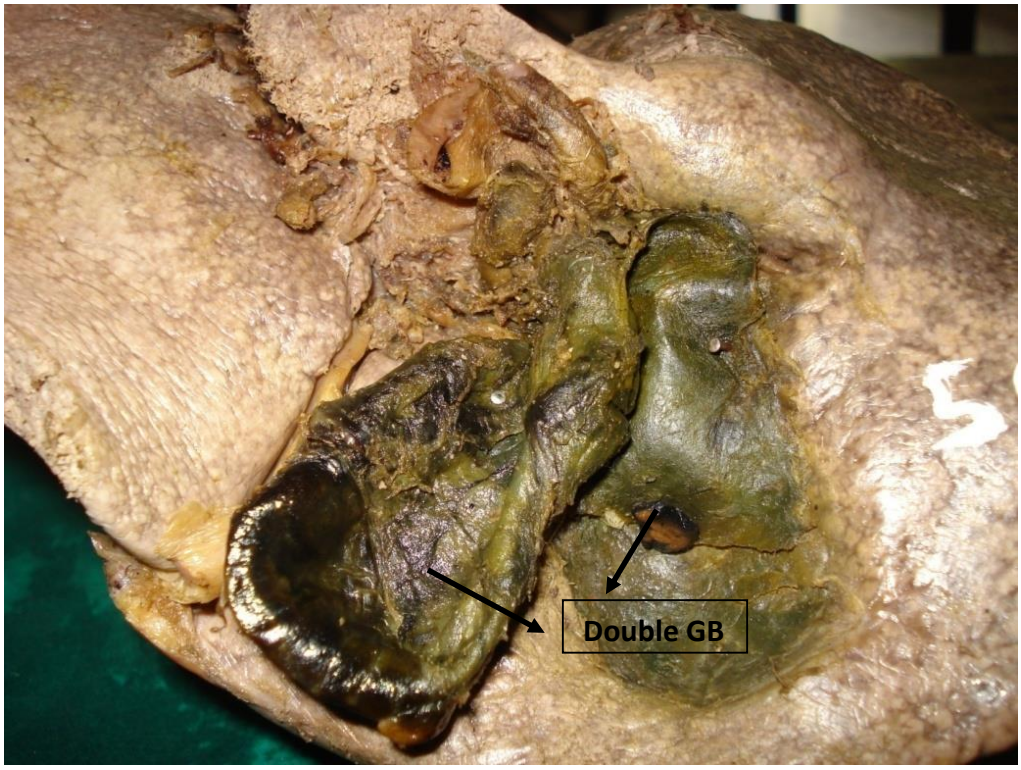
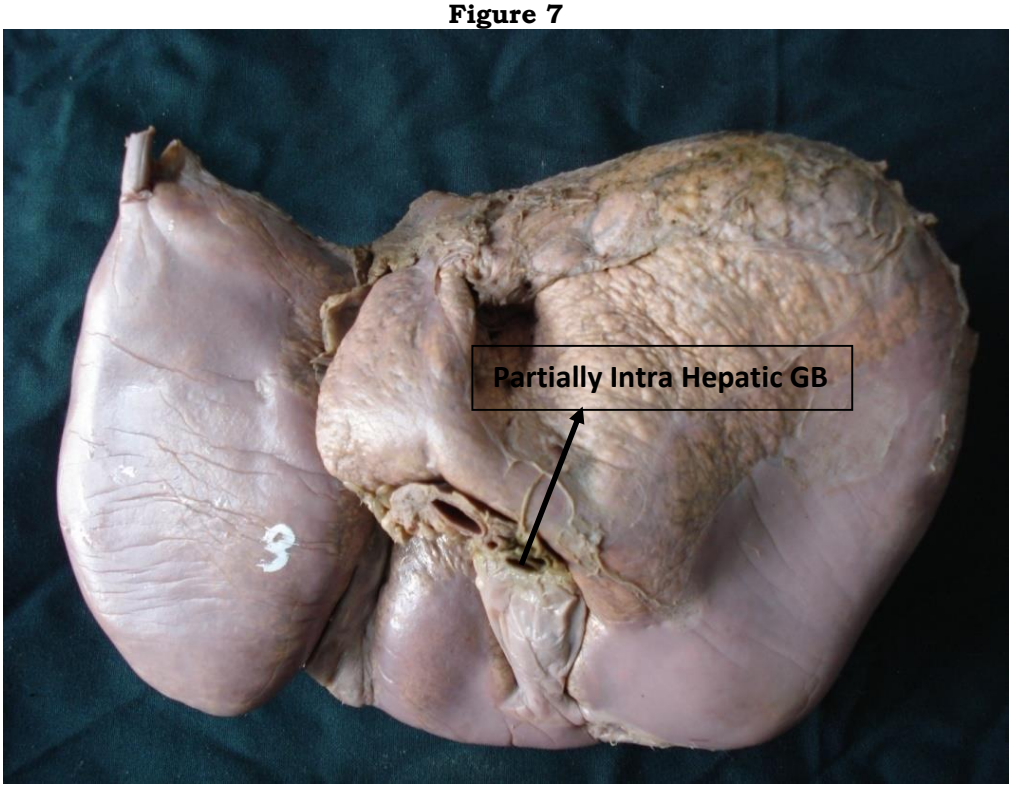


Figure 7



CONCLUSION

These variations and significant values will certainly help the clinician, anatomist, anthropologist and medico-legal expert to differentiate the South Indian findings with other parts of the country and abroad. Above all this study will help the laparoscopic surgeon to take preventive measures before cholecystectomy and the radiologist to differentiate the normal from anomalies. But it requires further study to throw more light upon genetic, embryological and nutritional factors because exact mechanism of contraction of GB, concentration and secretion of bile by GB is yet to be known. As gall bladder is cut and discarded if pathological, least attention is paid for this study.

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