

## MRI characterization of Liver Involvement in Autosomal-Dominant Polycystic Kidney Disease

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**Purpose:** To determine if women have more involvement with liver cysts in autosomal-dominant polycystic kidney disease (ADPKD).

**Methods:** 135 patients (M: F = 54:81, 19-83 years old, GFR 6-136 ml/min per 1.73 m<sup>2</sup>) enrolled in our ADPKD Data Repository underwent abdominal MRI using a body array coil, coronal and axial SSFSE 8 mm contiguous axial images and axial gradient echo T1 images were obtained. Organ volumes and cyst volumes were measured by manually contouring the outer margins and using histogram analysis identifying cysts on T2 images. T1 images were used to identify hemorrhagic cysts. Hepatic volume (HV), hepatic cyst volume (HCV), hepatic cyst fraction (HCF) and bilateral renal volume (BRV), renal cyst volume (BRCV), renal parenchymal volume (BRPV), spleen volume (SPV) were compared in all patients based on gender, age and GFR.

**RESULTS:** Overall the median/interquartile range (IQR<sub>(P25-P75)</sub>) age and GFR equal to 45/(36.5-55.8) yo and 56/(40-70.7) ml/min per 1.73 m<sup>2</sup> respectively. And the prevalence of hepatic cysts was 85.8% (115 of 134) with median/IQR<sub>(P25-P75)</sub> liver volume = 1487/1284-1898 ml and cyst fraction = 4/0.5-31.1%. There is significant correlation between HV and HCV, HV and HCF, HV and SPV, HCF and age, HCF and GFR, HCF and gender, HCF and BRV, HCF and BECV, BRV and BCV at P=0.01 level. Also a relatively weak significance is identified between HV and BRV, HV and BRCV, HCV and BPV, BPV and SPV at P=0.05 level.

In women, liver volume ranged from 669 ml to 7556 ml (median/IQR<sub>(P25-P75)</sub> = 1524/1220-2103ml) and cyst fraction ranged from 0.01% to 93% (median/IQR<sub>(P25-P75)</sub> = 9/1-49.7%). In men, liver volume ranged from 818 ml to 3339 ml (median/IQR<sub>(P25-P75)</sub> = 1472/1326-1792ml) and cyst fraction ranged from 0.05% to 71% (median/IQR<sub>(P25-P75)</sub> = 2.7/0.2-10.3%). Hepatic cyst fraction was significantly higher in females.

**Discussion and Conclusion:** MRI is ideally suited to imaging polycystic kidney/liver disease due to high sensitivity of T2 weighted sequences for fluids. Previous studies<sup>[1,2]</sup> have not reached a consensus about the role of the endocrine factors in determining how rapidly hepatic cysts progress. Our data like Bae et al<sup>[1]</sup> indicate that hepatic cysts in ADPKD are more prevalent in women than men, and women experience a larger burden of hepatic cysts than men at a younger age, implicating gender-specific factors, e.g. hormones may contribute to the pathogenesis of hepatic involvement in ADPKD.

**Table 1. Prevalence of hepatic cysts by gender and age groups**

Gender	Age	# of Patients	# with hepatic cysts	Prevalence(%)
Female	15-24	5	4	80
	25-34	11	9	81.8
	35-46	65	59	90.8
Male	15-24	3	1	33.3
	25-34	6	4	66.7
	35-46	45	38	84.4

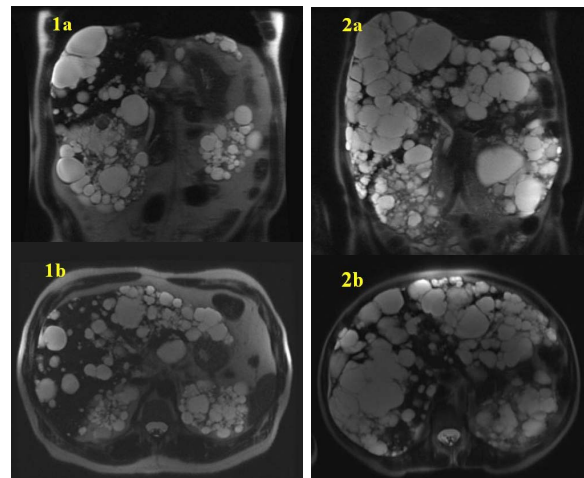
**Table 2. Test statistics results by gender groups**

	HCF	HCV	SPV	LKV	RKV	RKCV	Cr
Chi-Square	7.117	7.773	21.294	5.51	12.704	6.700	18.691
P value	0.008	0.005	0.000	0.018	0.000	0.010	0.000

HCF: Hepatic cyst fraction; HCV: Hepatic cyst volume; SPV: Spleen volume; LKV: Left kidney volume; RKV: Right kidney volume; RKCV: Right kidney cyst volume; Cr: Creatinine

### References:

- Bae KT, Zhu F, Chapman AB, et al. Magnetic resonance imaging evaluation of hepatic cysts in early autosomal-dominant polycystic kidney disease: The Consortium for Radiologic Imaging Studies of Polycystic Kidney Disease cohort. Clin J Am Soc Nephro 1: 64-69, 2006.
- Gall TM, Oniscu GC, Madhavan K, et al. Surgical management and longterm follow-up of non-parasitic hepatic cysts. HPB 11:235-241, 2009.



**Male and Female patients with greatest liver cysts:**

**Fig.1** 60yo male with HCF=73% and HV=3339 ml.

**Fig.2** 36yo female with HCF=92% and HV= 6119 ml.