

Hypertension and Cardiovascular Outcomes in Autosomal Dominant Polycystic Kidney Disease: A Systematic Review



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Introduction

- Autosomal Dominant Polycystic Kidney Disease (ADPKD) is characterized by the progression development of renal cysts that is one of the most common disorders leading to end stage renal disease(ESRD) (5% of total ESRD cases) [1]
- ADPKD is known to affect approximately 12 million people a year worldwide manifest into extra renal outcomes (liver cysts, intracranial aneurysms, and hypertension) [2][3]
- Despite vast research about cardiovascular outcomes of ADPKD in adults, these outcomes are also frequent and prevalent in the pediatric population.
- Hypertension is a frequent and severe complication of ADPKD that can spur the progression of other cardiovascular outcomes
- It is crucial to identify the early onset of Hypertension in ADPKD patients to aid in the management of the disease

Objectives

- Assess and identify the influence of early onset hypertension on other cardiovascular outcomes [Left Ventricular Mass Index (LVMI), Carotid Intima Media Thickness (cIMT), and Pulse Wave Velocity (PWV)] in ADPKD patients

Methodology

- Design:** A systematic review of Hypertensive ADPKD patients was conducted with a comprehensive search of existing literature of MEDLINE, EMBASE, CINAHL, and web of science through March 2021.
- Study Population:** Only male and female patients of all ages with an ADPKD diagnosis, and a positive status for hypertension or borderline hypertension were included for analysis.
- Study Variables:** Patient demographics (age, sex), diagnosis of hypertension (normotensive (NBP) vs hypertensive (HBP)), cIMT, PWV, LVMI
- Data Collection:** Data regarding ADPKD patients with a primary diagnosis of hypertension will be recorded. Data analysis will follow.

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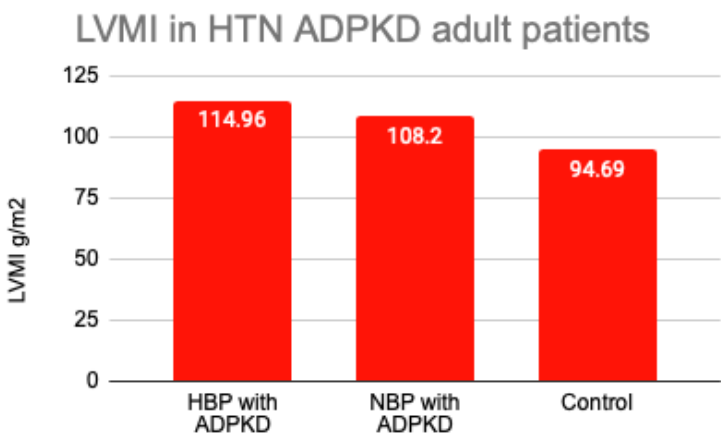
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Results

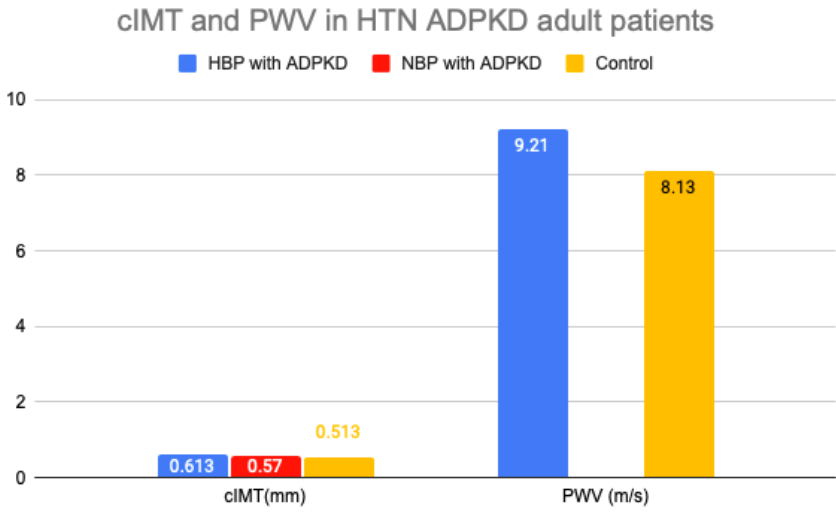
- Data regarding 1297 hypertensive ADPKD reported patients was analyzed.
- In addition, there was 342 controlled patients either with NBP ADPKD or healthy patients

Figure 1: LVMI in adult hypertensive ADPKD patients vs normotensive ADPKD and control patients



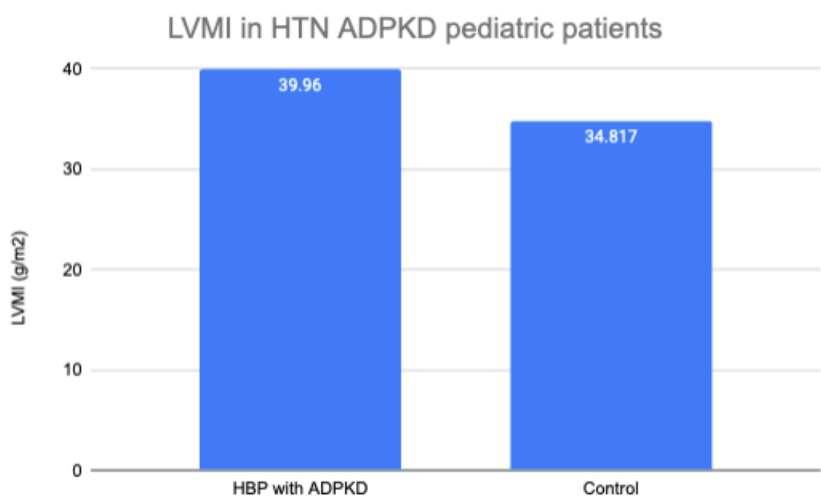
- Figure 1** identifies the influence of hypertension on LVMI in adult ADPKD patients
- The mean LVMI for Adult ADPKD patients with HBP, NBP, and controls were 114.96, 108.2, 94.69 g/m² respectively

Figure 2: cIMT/PWV in adult hypertensive ADPKD patients vs normotensive ADPKD and control patients



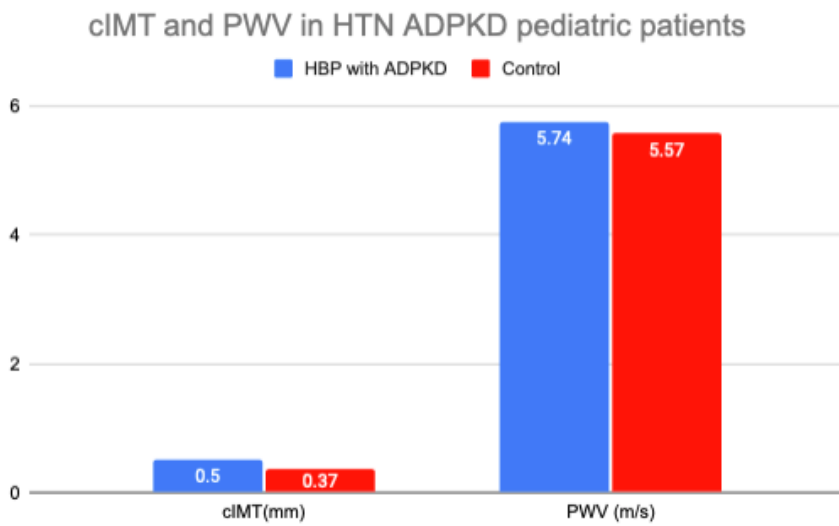
- Figure 2** identifies the influence of hypertension on cIMT and PWV in adult ADPKD patients
- The mean cIMT for patients with HBP, NBP, controls are 0.613 mm, 0.57 mm, 0.513 mm, respectively
 - The mean PWV for adult ADPKD patients with HBP and controls are 9.21 m/s and 8.13 m/s

Figure 3: LVMI in pediatric hypertensive ADPKD patients vs control patients



- Figure 3** identifies the influence of hypertension on LVMI in pediatric ADPKD patients
- The mean LVMI for Adult ADPKD patients with HBP and controls were 39.96, 34.817 respectively

Figure 4: cIMT/PWV in pediatric hypertensive ADPKD patients vs control patients



- Figure 4** identifies the influence of hypertension on cIMT and PWV in pediatric ADPKD patients
- The mean cIMT for patients with HBP and controls are 0.5 mm, 0.37 mm respectively
 - The mean PWV for adult ADPKD patients with HBP and controls are 5.74 m/s and 5.57 m/s

Discussion

- Blood Pressure evaluation is important for the management of patients with ADPKD
- ADPKD augments the activation of the RAAS through abnormal endothelial-Nitric oxide, cardiac function and renal cystic expansion which plays a central role in the hypertension found in ADPKD
- The onset of Hypertension accelerates cardiovascular manifestations
- High LVMI, PWV, cIMT indicated increased prevalence of arterial stiffness and hypertrophic vasculopathy, and atherosclerosis
- Patients on antihypertensive treatment or with increased cIMT also were reported with higher levels of microalbuminuria, implying vascular remodeling may be a novel marker of renal disease progression
- This suggests that vascular disease is prevalent before and during ADPKD and accelerates the progression of kidney disease
- This causal relationship highlights the importance of monitoring hypertension and screening for cardiovascular screening in ADPKD patients

Conclusion

- Hypertensive ADPKD patients (in both the pediatric and adult populations) show a significant relationship between elevated blood pressure and increased measurements in cardiovascular parameters
- This is an ongoing study and additional randomized controlled studies with larger populations and longer follow-ups are required to establish a more profound causal relationship