Feature

Chronic Kidney Disease in Persons Living with HIV: A Systematic Review

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The purpose of our systematic review of research on chronic kidney disease (CKD) in persons living with HIV (PLWH) was to (a) compare and contrast diagnostic criteria for CKD, (b) identify risk factors of CKD in PLWH, and (c) elucidate the prevalence of CKD in PLWH. Keyword searches of PubMed and PsycInfo databases were followed by manual searches of references from 2000 through 2016; 21 studies met inclusion criteria. Sample sizes ranged from 8 to 15,140, with a mean age of 50 years, and represented diverse ethnicities/races and countries of origin. Fourteen studies were cross-sectional, six were cohort studies, and one was a case study. Major risk factors were related to hypertension, diabetes, and age. Prevalence ranged from 2.3% to 53.3% across a variety of countries and patient populations. The wide range in prevalence may have been due to differences in risk factors for the sample populations.

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According to the Joint United Nations Programme on HIV/AIDS (2017), approximately 36.7 million people were living with HIV in the year 2016 worldwide. Since the development of combined antiretroviral therapy, the life expectancy of persons living with HIV (PLWH) has increased into the early 70s with treatment, which is similar to the expected age of the general population (Althoff et al., 2015; Nakagawa et al., 2012; Samji et al., 2013). With longer life spans, however, PLWH are developing other chronic medical conditions (Cailhol et al., 2011; Calza et al., 2014; Campbell et al., 2009; Winston, 2010).

One of the most commonly diagnosed chronic diseases in PLWH is chronic kidney disease (CKD), a condition three times more likely to develop in PLWH than in the general population (Bonjoch et al., 2014; Naicker, Rahmania, & Kopp, 2015). CKD consists of the gradual, irreversible destruction of functional units of the kidney (nephrons), which clean waste from the body and produce urine (Naftalin, Nathan, Hamzah, & Post, 2011). If uncontrolled, CKD can lead to end-stage renal disease, the need for dialysis, and ultimately, death (Choi et al., 2010; Gardner et al., 2003; Gupta et al., 2004; Ibrahim et al., 2012).

Factors associated with the development of CKD in PLWH are the same as those in persons without HIV; they include hypertension and diabetes. However, PLWH have the additional risk factor of HIV treatment (Bonjoch et al., 2014; Izzedine, Harris, & Perazella, 2009; Kopple, 2001; Naftalin et al., 2011; Naicker et al., 2015; Szczech et al., 2002; Winston, 2010). Antiretroviral medications, such as nucleoside reverse transcriptase inhibitors and protease inhibitors (PIs), can cause renal tubular dysfunction and decrease the rate at which the kidneys filtrate the blood (Hall, Hendry, Nitsch, & Connolly, 2011).

Because CKD is a risk factor for end-stage renal disease and death, early identification of CKD can prevent

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or reduce the risk of complications such as kidney disease progression and cardiovascular events (Choi et al., 2010; Ibrahim et al., 2012). Practitioners can assess for and detect kidney damage using several different methods, including lab tests that measure waste products in the blood. The estimated glomerular filtration rate (eGFR) is the primary measure of kidney function. The eGFR can be calculated using different formulas but, in general, the formulas use the level of creatinine in the blood along with demographic variables (e.g., age, body size, gender). Current clinical guidelines suggest 3- to 6-month regular screenings using the eGFR (Asboe et al., 2012; Kopple, 2001; Winston, 2010). However, there are other important measures for assessing kidney function, and eGFR can be calculated using different equation models.

Our systematic review builds on previous literature reviews concerning renal function in PLWH. Cure and colleagues (2015), who conducted a review to evaluate the impact of atazanavir (ATV)-based regimens on renal function in PLWH, concluded that the effect of ATV was similar to that for other antiretroviral regimens. Bagnis and Stellbrink (2015) conducted a systematic review to evaluate the impact of PIs, including ATV. They reported that PI-based regimens showed initial but nonprogressive decreases in eGFR; overall, however, the clinical significance of the findings remained uncertain.

Our systematic review investigated additional variables not explored in previous reviews (which focused on specific treatments that might influence the development of CKD) in order to synthesize current research that has encompassed a more comprehensive list of potential variables associated with CKD in PLWH. Our specific aims were: (a) to compare and contrast diagnostic criteria for CKD, (b) to identify risk factors for CKD in PLWH, and (c) to elucidate the prevalence of CKD in PLWH.

Design and Methods

We followed the PRISMA guidelines for our systematic review (Moher, Liberati, Tetzlaff, Altman, & the PRISMA Group, 2009). We assessed studies for design, purpose, sample, setting, CKD measurement, risk factors, and prevalence (see Figure 1).

Literature Search

We searched the PubMed and PsycInfo databases for articles from January 2000 through August 2016 (see Figure 1) to identify relevant studies. We used the following terms in differing combinations to locate a comprehensive list of articles: *incidence*, *prevalence*, *renal failure*, *renal disease*, *chronic kidney disease*, *CKD*, *kidney disease*, *HIV*, *AIDS*, and *human immunodeficiency virus*. Boolean operators AND and OR were used for each database. Initial studies were located with the electronic databases. The search was then supplemented by a manual search of relevant reference lists.

Study Selection

Studies were included if they involved adults older than 21 years of age, investigated PLWH with CKD, reported prevalence of CKD, and were published in a peer-reviewed journal. Studies were excluded if they were systematic reviews/meta-analyses, reviews, or editorials; were written in a language other than English; included pregnant women; or presented acute kidney disease only. Studies with pregnant women were excluded because pregnancy can change kidney function due to increased production of erythropoietin during pregnancy, which would make the findings difficult to compare to those who were not pregnant (Williams & Davison, 2008). Acute kidney disease was excluded because acute kidney disease is a sudden loss of function and likely to be reversible; it may have a different etiology (e.g., blood loss or dehydration) compared to CKD, which is a chronic disease with slow progression (Lee, Kang, We, Park, & Park, 1999).

Studies located through the database search were downloaded and independently screened for inclusion by two different individuals (see Figure 1). After the initial screen of article titles against the inclusion criteria, 437 nonduplicated abstracts were then screened using the same criteria.

Data Evaluation

Full text review was conducted on 61 articles against inclusion criteria. Quality was assessed using the quality assessment tool for observational cohort and cross-sectional studies developed by the National Heart, Lung, and Blood Institute (2014),