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Filtering the Facts, Kidney Health's Secret Impact on Blood Pressure Control in US Adults

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Summary: In the realm of medical research, the importance of managing Blood Pressure (BP) to control the risk of cardiovascular disease is established and commonly known. However, the control of BP (defined as systolic BP < 140 and diastolic BP < 90) among US adults with hypertension in the United States, has been decreasing over the past decade. Using publicly available data, this study aims to identify a potential factor contributing to this decline in BP control among hypertensive US adults. Our analysis emphasizes the potential role of kidney disease as an influential factor contributing to this trend. Through classical causal analysis techniques, our findings reveal that the presence of kidney disease substantially increases an individual's likelihood of not achieving the recommended BP control levels by 8% (6.4,8.9)_____. The discovery of this relationship highlights the importance of management techniques targeting both hypertension and kidney disease_____ in an attempt to increase the prevalence of proper BP control among hypertensive US adults. By addressing these conditions together, healthcare systems can potentially prevent cardiovascular diseases more efficiently, and promptly, enhancing overall patient well-being.

Key words: inferencestatisticshealthresearch.

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According to Wang and Vasan (2005), approximately 1 in 4 U.S. adults have uncontrolled hypertension, and thus lack adequate BP control. This is problematic as elevated levels of BP are associated with the strongest evidence for causation of cardiovascular disease Fuchs and Whelton (2020). Our aim of this study, is to identify a potential factor which may contribute to this decline in BP control among hypertensive US adults. According to Adamczak et al. (2002), the relationship between kidney disease and BP is a unique and complicated one, where the functionality of one's kidney has been linked to affect one's blood pressure. We further explore this linkage through the use of classical causal analysis tools and techniques.

Data from the US National Health and Nutrition Examination Survey (NHANES) was used to help answer this causal question, with potential confounding variables identified. According to Winocour (2018), approximately 30 to 40 percent of adults with diabetes has Cronic Kidney Disease (CKD). Furthermore, there have been a number of publications that support other factors such as smoking (Yacoub et al., 2010), Body Mass Index (BMI) (Lakkis and Weir, 2018), cholesterol (Gluba-Brzozka et al., 2019), diabetes (Winocour, 2018), and age (Mallappallil et al., 2014) all having an impact on the prevalence of kidney disease within an individual. However, these associations are highly interrelated with one another, and their relationships with one another must properly be specified. While arguably, diabetes is one of the leading causes of kidney disease (Winocour, 2018), other factors previously mentioned, such as BMI (Chobot et al., 2018), age (Yan et al., 2023), and smoking (Will et al., 2001) all possess an association with diabetes and need be considered. Likewise, it has been shown that there is an association between one's age and their smoking habits (Rogers et al., 1995) which needs to be taken into consideration as well. To add further complexity, there have been a large number of studies highlighting the amount of factors that influence one's cholesterol as well. According to Milyani and Al-Agha (2019) BMI can influence one's cholesterol levels, but so can smoking (van der Plas et al., 2023), and age

(Bertolotti et al., 2014) can too. Furthermore, our response variable of blood pressure control also has contributing associations that must be accounted for. According to Petrie et al. (2018), diabetes can also influence one's blood pressure, but so can an individual's age (Cheng et al., 2022), and BMI (Landi et al., 2018). Due to the interconnectedness that many of the variables within the dataset have, it is important that a proper directed acyclic gragh (DAG) is constructed to monitor and manage these relationships. Our aim is that through proper modeling of how these confounding measurements interact with one another, we can better understand what the causal effect of kidney disease on blood pressure control on adults in the United States.

1. Tables and Figures

[Figure 1 about here.]

[Figure 2 about here.]

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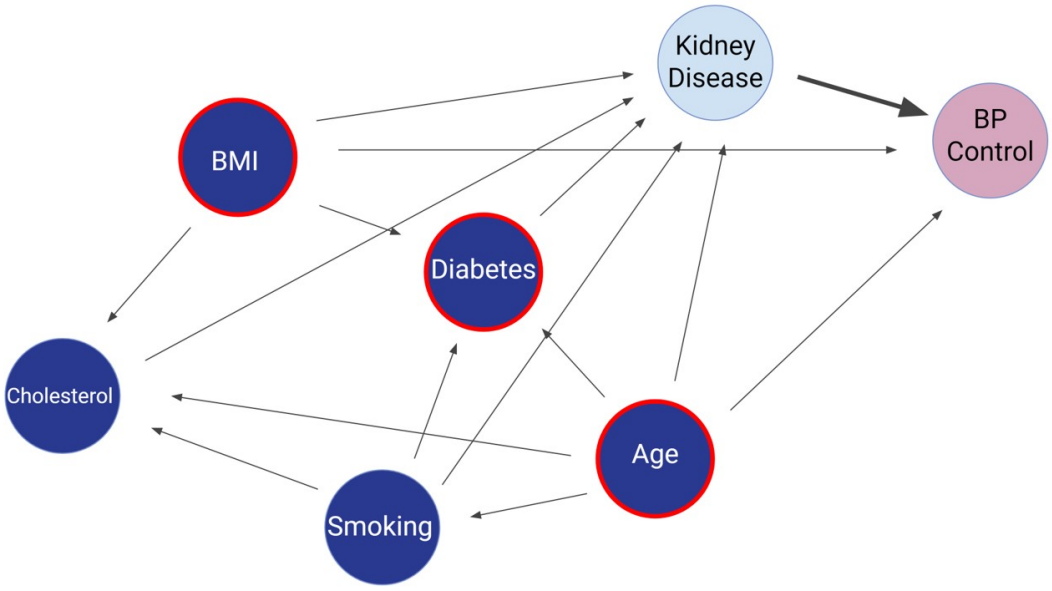
Kidney
Disease
BP
Control
BMI
Diabetes
Cholesterol
Age
Smoking

Figure 1. DAG

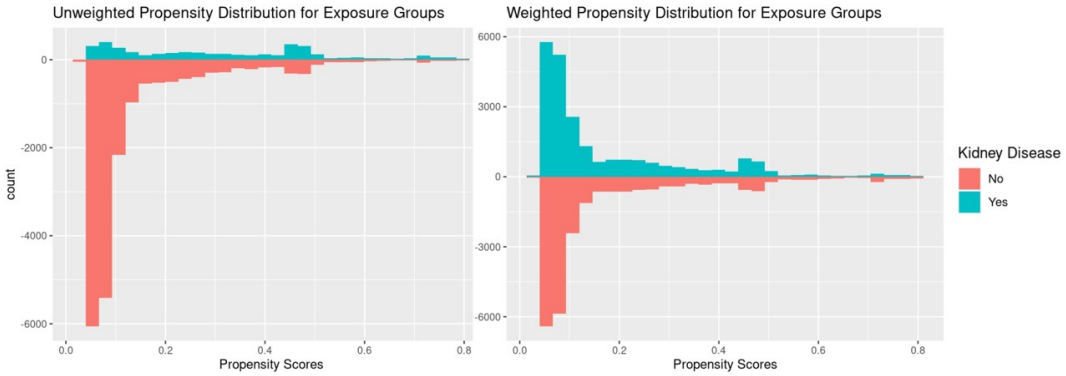

Figure 2. Propensity Score