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HYPERTENSION AND RENAL CELL CARCINOMA

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ABSTRACT

Advances in tumour diagnosis and treatment, particularly targeted drugs, have considerably improved renal cell carcinoma (RCC) survival while increasing the incidence of hypertension (HTN). As a result, identifying risk factors and enhancing therapeutic treatment for RCC and HTN patients are critical challenges. This study looked at both preclinical and clinical risk factors for HTN-RCC comorbidity. Obesity, smoking, and other lifestyle choices may be risk factors for both RCC and HTN. Second, RCC and HTN medications can interact with one another. Then, HTN treatment and RCC comorbidity reduction were addressed. Additionally discussed current study flaws and potential directions Finally, the goal of this study is to expand cardio-oncology knowledge and to help patients who are at high risk of or suffering from RCC and HTN.

1. INTRODUCTION

RCCs, which make up 80% to 85% of all primary renal neoplasms, are the most prevalent kind of primary renal neoplasm. About 8% of all malignancies are transitional cell carcinomas, which form in the renal pelvis. Oncocytomas, collecting duct tumours, angiomyolipomas, and renal sarcomas are examples of rare parenchymal epithelial malignancies. Nephroblastoma and Wilms tumour are prevalent in children. A rare but severe form of renal cell cancer linked to sickle cell disease is called medullary renal carcinoma. Less frequent subtypes include chromophobe, papillary, and clear cell tumours[1].
The most common type of adult kidney cancer is RCC. Men aged 50 to 70 are more likely to experience it. RCC incidence varies across the world, with North America and the Czech Republic having the highest prevalence. In the United States, there are roughly 14,000 fatalities every year and 63,000 new cases. The most lethal urologic illness is kidney cancer, and in 2013 an estimated 65,150 Americans were given the diagnosis [2]. Renal cell carcinoma (RCC), which includes a number of histological subtypes but the most prevalent of which are clear cell RCC (approximately 70% of RCC cases),

papillary RCC (10–15%), and chromophobe RCC (about 5%), accounts for over 90% of kidney cancer cases [3].

Obesity, hypertension, and smoking are all recognised modifiable risk factors for RCC. Epidemiologic studies have linked an increased risk of RCC to both hypertension and the use of antihypertensive drugs. Although studies have used a number of methods to separate the impact of these interrelated factors, it is still unclear if certain antihypertensive medicine classes increase the risk of RCC without simultaneously raising blood pressure[4].

High blood pressure, often known as hypertension, has long been linked to an increased risk of kidney cancer. Renal cell carcinomas make over 90% of adult kidney tumours (RCC). Generally recognised as a risk factor for RCC is hypertension, which is frequently defined as clinically verified high blood pressure. However, because of the kidneys' important function in maintaining blood pressure, the potential of reverse causation owing to pre-clinical cancer, and the confounding effects of other obesity-related risk factors, the link between blood pressure and RCC risk is convoluted [5].

In a research based on blood pressure genetic markers in a Mendelian randomization (MR) framework, it was discovered that diastolic blood pressure (DBP), but not systolic blood pressure (SBP), was linked to a greater chance of developing a blood malignancy. This MR-based study has different confounding restrictions than traditional observational studies since blood pressure was monitored directly and would not be impacted by reverse causation in the former [6].

The MR study brought up a number of issues with previous findings from prospective cohorts, including whether the associations between DBP and SBP and RCC risk are independent and whether undiagnosed kidney cancer can lead to high blood pressure and skew traditional observational studies through reverse causation[6]

1.1. Modifiable Risk Factors in Common

Dose-dependent risk factors for hypertension include obesity, alcohol usage, and insufficient exercise. Despite the complexity of the link between smoking and HTN, it is obvious that quitting smoking may significantly lessen the burden of cardiovascular disease [7]. Alcohol can help prevent the development of RCC, but other risk factors for the disease include smoking, being overweight, and not getting enough exercise [8]. In addition, the connection between HTN and RCC and diet is substantial. Additional study is needed to elucidate the connection between RCC and HTN and the typical bad diets that contribute to both conditions. For instance, eating too much salt causes hypertension, and consuming too much red meat and fatty foods increases the likelihood of developing renal cell carcinoma (RCC). It's possible that RCC rates might rise if people didn't eat enough fruits and vegetables. Risk factors for RCC and HTN that may be modified include smoking, obesity, and insufficient physical activity[9].

1.2. • Obesity as an RCC Risk Factor

Kidney cancer risk was shown to be 35% greater in patients with a body mass index (BMI) between 25 and 30, and 76% higher in those with a BMI of 30 or more, according to a meta-analysis of 24 cohort studies. Measures of obesity used in clinical studies ranged from body mass index to hip and waist circumference to body fat percentage, but findings were comparable across all of these indices[10]. Large cohort studies have shown that there is a five percent increase in RCC risk for every unit increase in body mass index. The risk of developing renal cancer is increased by obesity at any time throughout adulthood or after a diagnosis of renal cell carcinoma (RCC) (odds ratio [OR] = 1.6, both)[11]. According to a Japanese cohort study, a low BMI of 21 may increase the risk of kidney cancer compared to a BMI of 23.0–24.9 [hazard ratio (HR) = 1.86; 95% CI: 1.01-3.45]. However, research shows that obesity raises the risk of clear-cell RCC while lowering the risk of papillary RCC. Women, the elderly, and individuals of colour had a higher risk of developing papillary RCC, suggesting that demographic factors are at play here[12]**.**

Obesity-induced chronic renal hypoxia has the potential to be carcinogenic, especially when the vascular endothelial growth factor (VEGF) pathway is engaged. Lipid peroxidation may be facilitated

by obesity, aiding RCC development. Renal hyperfiltration brought on by obesity may expose you to more nephrotoxins that cause cancer[13]. The insulin-like growth factor-1 (IGF-1) receptor is upregulated in obese individuals, which increases IGF-1's carcinogenic effects. Metabolic issues associated with obesity are a known carcinogen. RCC development may be aided by insulin and IGF-1 overexpression. Adiponectin, a protein secreted by adipose tissue, inhibits the VEGF pathway and acts as an anti-angiogenic substance. However, adiponectin levels in serum are lower in obese people [9]. The adipokine leptin, which regulates VEGF, extracellular signal-regulated kinase 1/2, and the Janus kinase/signal transducer and activator of transcription 3 pathways, all contribute to the promotion of RCC. Increased production of Interleukin-6, an oncogenic adipokine that may protect RCC cells from immune responses, results from inflammation brought on by obesity[14].

By boosting renal salt reabsorption and igniting the sympathetic nervous system, obesity-related insulin resistance and elevated circulating insulin may contribute to HTN. Leptin levels that are elevated may cause HTN via elevated sympathetic nervous system activity[15]. Additionally, melanocytes secrete a-melanocyte-stimulating hormone (a-MSH), which has the capacity to control blood pressure by reducing adrenocorticotropic hormone. Interestingly, by inhibiting the melanocortin 4 receptor, a-MSH may also prevent the development of obesity. As a consequence, it is thought that exposure to sunshine may increase a-MSH levels and shield obese people from inflammation-related high blood pressure [16].

1.3. Lack of Physical Activity as an RCC Risk Factor

It is believed that a lack of physical exercise increases the risk of RCC. The multivariate relative risk (RR) for those who exercised more than four times per week was 0.77 (95% CI: 0.64-0.92) compared to those who did not in research of 482,386 persons in the United States with a median follow-up of 8.2 years. Teenagers who regularly participate in physical exercise are also safeguarded [17] Similar results were observed in a 2013 meta-analysis of 19 studies that revealed regular physical exercise to be a protective factor against RCC (RR = 0.88, 95% CI: 0.79-0.97). Once age and gender were taken into consideration, frequent walking or running was connected to a lower risk of kidney cancer (1.9% risk reduction per metabolic equivalent hour/week) [17].

Either directly or indirectly, exercise may lower the risk of RCC. By reducing lipid peroxidation, blood IGF-1 levels, and insulin resistance, exercise may directly prevent the development of RCC. As insufficient calorie intake might result in obesity, which boosts the development of RCC, several studies thought that a lack of exercise constituted an indirect risk factor. In addition, additional exercise may help avoid diabetes and high blood pressure, both of which are aggravating issues [8].

The biochemical reasons for inactivity-related hypertension (HTN) are poorly known. Insulin resistance and a disproportion between the sympathetic and vagal nerves have both been implicated as potential reasons in animal studies. Resistance training may be able to prevent blood artery narrowing and halt the loss of luminal width, according to a second animal study. Inactivity-related hypertension is influenced by a number of variables, including vascular resistance, arterial stiffness, oxidative stress, inflammation, body mass index (BMI), and endothelial function (HTN)[18].

1.4. Hypertension is a primary cause of RCC.

The risk of renal cell carcinoma (RCC) was found to increase by 5% (95% confidence interval [CI]: 1.03-1.06) for every 10 mmHg increase in systolic blood pressure (SBP) and by 7% (95% confidence interval [CI]: 1.04-1.10) for every 10 mmHg increase in diastolic blood pressure, according to a meta-analysis of 18 prospective studies and 14 case-control studies (DBP). On the other hand, in conditions of extremely high pressure (SBP > 150 mmHg or DBP > 100 mmHg), the incidence of RCC will rise exponentially rather than linearly. RCC is a pressure-sensitive malignancy, which explains why. It's critical to remember that having hypertension alone can increase your risk of developing RCC (SBP: 130-140 mmHg, DBP: 80-90 mmHg)[19].

There is some evidence to suggest that women with hypertension have an increased chance of developing RCC. In a recent meta-analysis, females were found to be at 54% greater risk of developing

HTN than males (RR = 63 vs. 29%), though this disparity narrowed considerably after controlling for factors such as age, smoking status, family history of RCC, body mass index, alcohol consumption, and level of physical activity (1.40, 1.12-1.74 for men and 1.54, 1.17-2.04 for women)[19].

Age may have an impact on the occurrence of RCC in HTN patients, however this idea is still debatable. One study revealed that HTN was not a sole risk factor for RCC in adolescents, whilst another reported that HTN was associated with a higher risk of RCC in younger persons [20].

It's worth noting that high blood pressure and obesity may both contribute to an already elevated risk of renal cell carcinoma. High blood pressure (systolic > 160 mmHg or diastolic > 100 mmHg), as seen in the aforementioned prospective study, has been linked to an elevated risk of RCC in obese individuals. The reliability of these studies, however, may depend on a variety of factors. Since HTN and RCC share several risk factors, it is essential to adequately account for these confounding variables when analysing the association between the two conditions. Furthermore, HTN is defined and measured in a variety of ways. If RCC is discovered in patients with HTN in the first few years after cohort inclusion, it could be difficult to discern the incidence sequence of RCC and HTN. However, if the first few years of data are excluded from the analysis, this bias might be lessened. [21].

Renal cell carcinoma (RCC) associated with hypertension is thought to be influenced by a number of factors, including chronic inflammation, hypoxia in the kidney, an increase in hypoxia-inducible factors, overexpression of vascular endothelial growth factor (VEGF), and platelet-derived growth factors (PDGF). In HTN patients, overexpression of angiotensin receptors and angiotensin-converting enzyme may upregulate angiotensin II and induce oncogenic VEGF overexpression[22]. Hypertension (HTN) is also associated with alterations in blood vessel function and remodelling, which may increase levels of reactive oxygen species and promote tumour growth. Higher lipid peroxidation in HTN patients may contribute to the progression of RCC in a manner similar to that seen in obese individuals.

1.5. Antihypertensive Drugs and Renal Cell Carcinoma Risk

Antihypertensive drugs, in general, do not raise the risk of acquiring cancer. According to a recent Korean cohort study, antihypertensive medication use is connected with an increased risk of renal cell carcinoma (RCC) among hypertension patients. This risk was significantly higher for individuals who took two or more antihypertensive medications (HR = 1.80, 95% CI: 1.69-1.91). A second cohort research that controlled for smoking, BMI, age, and hypertension confirmed this conclusion. The risk of RCC increased by 2% year for every year spent on antihypertensive medication (95% CI: 1.01-1.02)[23]. However, the development of RCC is affected differentially by the many kinds of antihypertensive medicines that are available. In contrast to diuretics, which have been linked to the development of kidney tumours, angiotensin-converting enzyme inhibitors and angiotensin receptor blockades, abbreviated as ACEI/ARBs, have the potential to be used as cancer treatments. There is a significant amount of debate about the utilisation of CCBs and blockers[24].

1.6. Diuretics

Diuretics, according to many experts, increase the risk of renal cell carcinoma. Extensive observational evidence suggests that the use of diuretics may raise the risk of RCC by 34% (95% CI: 1.19-1.51) by the year 2020. After adjusting for hypertension, smoking, and obesity, another meta-analysis indicated that the risk effect of diuretics remained. Consistent findings were found across a wide variety of cohort and case-control studies. Compared to men, women using diuretics had a higher risk of developing renal cell carcinoma (RCC) (OR = 1.18, 95% CI: 0.93-1.49) [25]. Women may be more likely to use diuretics than males, and the action of estrogens on thiazide in the distal tubule may help explain the gender gap. There are many possible methods through which diuretics act as carcinogens. To begin, hydrochlorothiazide may be metabolised in the stomach to nitroso compounds, which may cause genetic abnormalities. Second, the renal tubular cells that these medications aim to stimulate may be somewhat more prone to developing cancer. Additional preclinical research is required to better understand the potential carcinogenic pathways of diuretics[26].

1.7. Calcium Channel Blockers

It is not quite known what role CCB plays in the development of RCC. CCB users had a higher likelihood of developing papillary RCC as opposed to clear-cell RCC, as shown by the findings of a study that looked back at previous patients' medical histories. Chronic usage of CCB, which may do this via reducing DNA breakage and cellular death in hypertensive patients, has been related to an increased risk of renal cell carcinoma (RCC), which stands for renal cell carcinoma. However, other research were unable to uncover any connection to cancer, which calls into question the validity of their carcinogenic assertions[27].

1.8. β-Blockers

Less is known about how -blockers affect the incidence of RCC. In comparison to other antihypertensive drugs, -blockers had a greater risk of RCC, according to a recent cohort research. However, it was discovered that -blockers did not increase the risk of total cancer incidence in another large cohort experiment. Therefore, it is unknown how exactly -blockers could act as a cancer promoter[28].

1.9. Angiotensin-Converting Enzyme Inhibitors/Angiotensin Receptor Blockades

It's unclear what part ACEI/ARBs play in the process. The risk of RCC was shown to be increased by ACEI in a meta-analysis (RR = 1.50, 95% CI = 1.01-2.23). In certain cases, ACEI may promote RCC and bradykinin development. As VEGF is increased by overexpressed angiotensin receptors and II, ACEI/ARBs may be useful as anti-cancer medications.

Several clinical studies have found a correlation between antihypertensive drugs and RCC, although conclusive results have been hampered by methodological and other challenges. First of all, high blood pressure (HTN) is a serious condition. People whose blood pressure was properly controlled by antihypertensive medication were not shown to have an elevated risk of renal cell carcinoma, according to large prospective research published in 2008. (SBP 160 mmHg or DBP 100 mmHg). Large numbers of people were followed over the period of several years (RCC). Because of this, I now have a tangible illustration of how challenging HTN is. Two, other potential confounding variables may have existed but were ignored, including age, gender, obesity, smoking, and level of physical activity. This may occur as a result of using too small of a sample size in the statistical analysis. A large-scale prospective clinical trial of rigorous design is required to further understand the connection between antihypertensive medications and RCC[4].

1.10. RCC Causes HTN Directly

Malignant hypertension may serve as an early warning sign for renal cell carcinoma, since the prevalence of RCC was 1.2% in the group with malignant HTN, significantly greater than those without (0.01%). Paraneoplastic illness is suspected when hypertension is caused by RCC itself. Paraneoplastic hypertension (HTN) may be severe and difficult to control. Nephroplasties are the primary treatment for hypertension caused by paraneoplastic tumours[29].

The activation of the renin-angiotensin-aldosterone system results in HTN when renal ischemia results from tumour compression, renal arteriovenous fistula, or ureteral obstruction. HTN in paraneoplastic patients is also associated with ectopic catecholamine and erythropoietin production. HTN was caused by hypercalcemia, which raised catecholamines and vascular resistance. Additionally connected to paraneoplastic nodular polyarteritis is renal vascular HTN. Intracranial HTN may result from RCC brain metastases squeezing the dural venous sinuses[30].

2. PATIENTS AND METHODS

This study used information from the Shanghai Women's Health Study (SWHS) and the Shanghai Men's Health Study (SWMS) (SMHS). The SWHS surveyed 74,942 Chinese women in 7 Shanghai neighbourhoods between the ages of 40 and 70 between 1996 and 2000. In the meantime, 61,480 Chinese men from 8 Shanghai neighbourhoods who were between the ages of 40 and 70 joined in the SMHS. The Shanghai Cancer Institute was successful in locating patients living in the neighbourhood who had been diagnosed with RCC by conducting twice-yearly patient follow-up and connecting patient cohorts to the Shanghai Cancer Registry.

We conducted nested case-control research among individuals who had access to comprehensive outcome data in order to increase our sample size and ensure that both groups of participants are followed-up on. RCC was identified in 147 men and 124 women using the ICD-9 diagnostic code 189.0. Using incidence density sampling, ten cases from the same cohort were randomly chosen. These controls were matched with each case based on their sexes, cohort enrollment ages (two years), calendar time of recruitment (30 days), and menopausal status (for women). A total of 2,693 controls were used, including 1 male case and 2 female controls and 1 male case and 1 control.

3. RESULTS

A number of baseline factors for men and women, including anthropometric, lifestyle, and other baseline variables, were analysed together with 271 cases of renal cell carcinoma (RCC) and 2,693 matched controls. In both the case and control groups, there were 45.8% more female participants. Both cases and controls were enrolled at the same age of 58, with women being slightly younger than men at that time (57 vs. 59 years). The mean WHR was the same for both patients and controls (0.9), but patients had a higher BMI (24.6 kg/m2 vs. 24.1 kg/m2) (P=0.01). The prevalence of being overweight or obese (BMI>25.0) was higher in patients (42.0% vs. 36.7%), despite there being no statistically significant difference in the general or sex-specific distributions of BMI between cases and controls. A rate of 41.7% was reported by the patients, which was statistically significantly greater than the rate of 31.9% in the control group (P = 0.001). Significant differences between cases and controls were observed for both sexes despite men having greater levels of hypertension. Males were more likely than females to drink alcohol (18.4% of cases vs. 26.9% of controls, P=0.03), although female alcohol intake was less common (2.4% of cases vs. 3.0% of controls). Additionally, there was a statistically significant difference between the likelihood that a patient drank alcohol and that they did not (34.0 vs. 27.1%; P=0.02) (11.1 vs. 16.0%; P=0.03). There was no difference in smoking behaviours or educational level between the case and control groups.

In contrast, when body mass index was modelled as a continuous variable, the risk of RCC was not significantly higher in women or the general population. The body mass index difference between the sexes was discovered to have a P value of 0.08. There was a 50% increase in RCC risk for every 5 kg/m2 increment in male BMI (95% CI: 1.1, 2.0) after confounding variables were taken into account. Men with the highest BMI (>30.0; OR, 1.5; 95% CI: 0.6, 4.1) showed a higher risk of RCC when body mass index was modelled as a categorical variable using WHO cut-offs. With an OR of 2.6 (95% CI: 1.02, 6.7), women with a BMI of 18.5 had a greater risk of developing RCC than women with any other BMI. The odds ratios for both men and women who were obese were slightly lower when Asian cut-offs were used, although there was a bigger population in the highest BMI category (BMI>25.0). However, there was no clear correlation between body mass index categories and RCC risk. WHR and RCC were not linked in either the combined study or the gender-specific studies.

In a similar vein, we found no correlation between any of these factors and RCC risk in our group. Current alcohol consumption was adversely linked with RCC risk in both sexes but not statistically significantly (OR, 0.7; 95% CI, 0.5, 1.05).

The risk of RCC was shown to be higher in people who had chronic hypertension. Overall, among women with a history of hypertension for less than ten years, the OR for RCC was 1.4 (95% CI: 0.8, 2.4), and in men with a similar history, it was 1.3 (95% CI: 0.8, 2.1). For those who had hypertension for at least ten years, the RCC OR increased to 1.5 (95% CI: 1.1, 2.1), 1.6 (95% CI: 0.99, 2.7), and 1.4, respectively. Both overall and among females particularly, an increase was seen (P trend=0.0118)

Due to their RCC diagnoses within the first two years of follow-up, twelve women and twenty-seven men were excluded from the analyses. The odds ratio (OR) for hypertension was 1.40 (95% confidence interval: 1.03, 1.9), with women having a higher OR (OR) of 1.40 (0.9, 2.3) and men having a lower OR (OR) of 1.30 (0.9, 2.1). For a future increase in BMI in women, an increase in BMI was linked with an odds ratio of 1.0 (95% CI: 1.004, 1.1), and for a future increase in BMI in males, an odds

ratio of 1.1 (95% CI: 1.003, 1.2). Women who had a BMI of 18.5 or below had a 2.6 (95% CI: 1.02, 6.6) higher risk of RCC than women who were of normal weight.

4. DISCUSSION

Based on the findings of this case-control study that was integrated into two sizable prospective cohorts, we demonstrated that self-reported hypertension is a significant independent risk factor for RCC in Shanghai, China, with a 40% greater risk for both men and women. A 50% higher risk of RCC was observed in participants whose hypertension diagnosis was made at least ten years before their cancer diagnosis, minimising the possibility of reverse causation, and indicating that the link between hypertension and RCC is unlikely to be caused by RCC. By eliminating individuals who were diagnosed within two years of joining the cohort, our sensitivity analysis helps to support this conclusion. Numerous case-control and cohort studies conducted in Western nations, as well as a previous population-based case-control study conducted in Shanghai, China, support the conclusion that hypertension increases the incidence of RCC.

RCC is one of the malignancies that has frequently and strongly been linked to obesity in both sexes, regardless of study methodology or demographic. A recent quantitative synthesis of the epidemiologic data revealed that RCC risk ratios per increase in body mass index of 5 kg/m2 were 1.24 (95% CI: 1.15, 1.34) for men and 1.34 (95% CI: 1.25, 1.43) for women. Changes in lipid peroxidation, chronic inflammation, renal hemodynamics, and an "obesogenic" endocrine and metabolic milieu are some of the theories put out to explain the link between obesity and RCC.

According to this nested case-control study from China, men, but not women, had a higher chance of developing renal cell carcinoma when their body mass index was higher. The relative risks (ORs) for men with a 5 kg/m2 increase in BMI were 1.5 (95% CI: 1.1, 2.0), and for women they were 1.0 (95% CI: 0.8, 1.3), according to the aforementioned meta-analysis. This finding supports a 2008 study from Korea that employed a prospective cohort design and discovered that there was a weaker association between BMI and kidney cancer in women than in males. Males in the study had hazard ratios for obesity (BMI30) and overweight (BMI25.0-29.9) of 1.38 (95% CI: 0.76, 2.52) and 1.11 (95% CI: 0.93, 1.31), respectively, whereas females had hazard ratios for obesity and overweight of 0.92 (95% CI: 0.64, 1.31) and 1.21 (95% CI: 0.58, 2.53).

Traditional BMI cutoffs may not be as useful in analysing the relationship between BMI and RCC risk in Asians as they are in Europeans or Americans due to the decreased prevalence of obesity in Asia. The Shanghai Men's and Women's Health Studies found that just 2.6% of men and 5.1% of women were obese, compared to 0.8% of men and 2.4% of women in the Korean study. Male and female obesity rates in the Multiethnic Cohort were 13.8% and 18.0%, respectively, but were significantly higher in the majority of European or American population studies (BMI30). BMI cutoffs specific to Asians are utilised to more accurately categorise instances. We discovered marginally positive associations between obesity and RCC in both men and women using these updated criteria, however they were not statistically significant. A 2004 WHO consensus statement states that the evidence is still insufficient to support the use of a lower cutoff criterion to detect overweight and obesity in Asian populations. We adopted the widely established World Health Organization (WHO) standards for overweight (BMI25) and obesity in our primary analysis to make our findings more comparable to those of other studies (BMI30). Our results demonstrate that Chinese women who are underweight have a much higher chance of developing RCC, indicating the need for further study. Even after accounting for the possibility of reverse causation, it continued to pose a concern.

Body mass index (BMI) is the most frequently used indicator in epidemiological research to identify general obesity, however it does not account for the body fat distribution, which varies significantly between multiethnic groups for a particular BMI score. WHR, a proxy for visceral obesity that is less affected by variations in lean mass, showed a positive correlation with RCC in both the Women's Health Initiative Study and the Iowa Women's Health Study. A genetic locus that raises the risk of both WHR and RCC has just been discovered. The current investigation demonstrated no statistically significant

correlation between WHR and RCC risk in either gender, like the European Prospective Investigation into Cancer and Nutrition Investigation.

There are several benefits to studying. A case-control research carried out in Shanghai in 1992 is the only epidemiologic investigation of RCC that has been published in China. These results, which are based on the use of two carefully designed cohorts, represent the first prospective analysis of RCC risk factors in China. The majority of the participants were of Chinese heritage, which helped eliminate any racial biases. We were able to enrol all eligible patients in the trial while preserving the same level of statistical power as we would have with a cohort analysis by randomly choosing 10 matched controls for each instance.

The current studies have some restrictions. First, the statistical power of our investigation was decreased by the inclusion of two large cohorts but few RCC cases. More RCC cases will be added when the cohort is followed, extending the sample, and improving the results. We were unable to assess the risk of RCC by category BMI using WHO cut-offs since only 4.4% of cases and 4.2% of controls were obese. We concentrated on hypertension and BMI instead since few women smoked or drank alcohol. Third, because blood pressure was not taken at the start of the experiment, we might have exaggerated the link between hypertension and RCC. The incidence of antihypertensive medication was unclear. No class of antihypertensive medications was consistently connected to an increased risk of RCC, and the majority of epidemiologic studies suggest that hypertension causes this cancer. Four, it was carried out in Shanghai, the most industrialised city in China, in two cohorts. This implies that the results might not accurately represent Chinese society, especially in rural areas.

5. CONCLUSION

Modern society has a high illness burden from HTN and RCC patients due to lifestyle changes and VSP use. This review examined the comorbidity and benefits of RCC and HTN from scientific, epidemiological, and clinical perspectives to improve understanding. However, many concerns remain. Other modifiable risk factors like obesity, smoking, and inactivity lack proof. The exact role of antihypertensive drugs in tumour growth is unknown, and doctors lack high-quality evidence on HTN secondary to RCC treatment. To address cardio-oncologic difficulties, we recruited basic scientists, public health officers, oncologists, cardiologists, and other health professionals. This observational and MR study supports DBP as a key RCC aetiology. SBP and RCC risk were unclear, while DBP appeared to be a factor.

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