e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(1); 517-527

Systematic Review

A Comprehensive Examination of Microalbuminuria in Individuals Affected by Non-Hypertensive and Non-Diabetic Conditions: A Systematic Review

Deepa Periasamy[1], Sangeetha Raja[2], Bagavathiammal Periyasamy[3]*, Panneerselvam Periasamy[4]

[1]Assistant Professor, Department of Biochemistry, Government Erode Medical College and Hospital, Perundurai, Erode, Tamil Nadu

[2]Assistant Professor, Department of Biochemistry, Government Erode Medical College and Hospital, Perundurai, Erode, Tamil Nadu

[3]Associate Professor, Department of Biochemistry, Swamy Vivekanandha Medical College Hospital and Research Institute, Tiruchengode, Namakkal, Tamil Nadu

[4]Research Scholar in Medical Physiology, Vinayaka Mission's Research Foundation (Deemed to be University), Salem, Tamilnadu

Received: 25-10-2023 / Revised: 23-11-2023 / Accepted: 26-12-2023

Corresponding Author: Dr. Bagavathiammal Periyasamy

Conflict of interest: Nil

Abstract:

The work states that microalbuminuria (MA) is an amount of urinary albumin that is higher than the standard value, but also lesser than the amount identified by a predictable measuring scale. It also shows that in non-diabetic patients, the amount of sugar level in the urine of the person increases. The increases of the sugar level make increase of the drowsiness and the stress of the individual. The insulin level of humans decreases. These diseases in hypertension are elaborated as early identification of damage in the kidney and an interpreter for last stage in the kidney disease and cardiovascular disease. Thus makes the increase of the values of the keratin amount of the patient. This results as the major factor in making the uneven function of the body in making the filtration of the liquid. The malfunction of the kidney in the internal function of the body makes increase of other organ's dysfunction.

Keywords: Microalbuminuria, non-hypertensive, Non-diabetic, Heart diseases, Kidney diseases.

Introduction

Microalbuminuria is a condition where a small amount of albumin, a protein, is present in the urine. It is a sign of kidney damage and is a predictor of "cardiovascular disease (CVD)" in people with hypertension and diabetes. However, recent research has shown that microalbuminuria may also be a predictor of CVD in "non-hypertensive and non-diabetic patients", particularly in those with a recent ischemic stroke.

In this examination, we will discuss microalbuminuria in "non-hypertensive and non-diabetic patients" with recent ischemic stroke, its significance as a predictor of CVD, and possible strategies for prevention and management.

The study introduces the concept of microalbuminuria in non-hypertensive and non-diabetic patients. It is a sign of atherosclerosis and this also directs to intermediate heart diseases. This disease has increased majorly among the diabetic and non-diabetic populations of the mass. It shows the effects of diseases on patients with sudden strokes. This study shows side effects and the remedies of the diseases among the population. It makes the collection of information from "non-hypertensive and non-diabetic patients".

Microalbuminuria is defined as the excretion of albumin in the urine at levels between 30 and 300 mg/day, which cannot be detected by conventional dipstick tests. It is an early sign of kidney damage and is used as a marker of kidney function. However, recent studies have shown that microalbuminuria is also a predictor of CVD, particularly in people with hypertension and diabetes. This is because microalbuminuria is a sign of endothelial dysfunction, which is an early stage of atherosclerosis, a condition in which plaques build up inside the arteries, which is leading to decrease the flow the blood and increasing rate and risk of stroke as well as heart attack.

Objectives

In this study, some of the basic objectives are properly identified and described. This includes the basic concept of microalbuminuria in non-hypertensive and non-diabetic diseases-affected people of the population. Some of the objectives of microalbuminuria are as follows:

- To evaluate the concept of microalbuminuria
- To identify the effects of microalbuminuria among the humans of the world
- To detect microalbuminuria among the patients of the population who are non-affected with diabetes
- To examine microalbuminuria in patients who are not affected by the hypertension
- To analyze the effects of ischemic stroke caused by the microalbuminuria
- To state some of the methods making the remedies of the disease among the patients of the world

Methodology

In the methodology section, the collections of the data are collected based on intermediate stroke that occurred in patients who are not affected by diabetes and hypertension. The work makes the presentation of all the microalbuminuria causing stroke among the patients of the population.

The representation of all this information is collected from the article and the journal is based on this topic. Thus by examining all the outcomes of microalbuminuria and the effects of that among the patients of the population are shown.

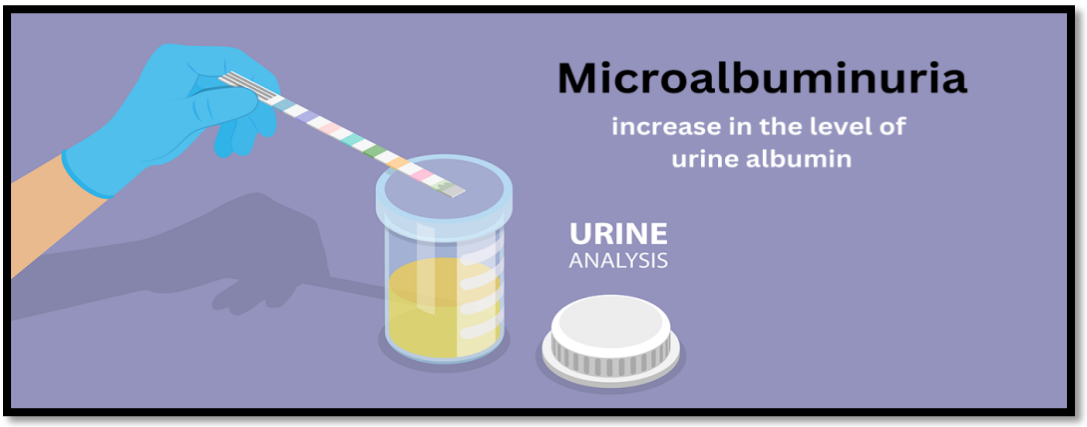

Figure 1: Microalbuminuria
(Source: Influenced by 2)

Figure 1 demonstrates the analysis of urine by using microalbuminuria. Recent studies have shown that microalbuminuria may also be a predictor of CVD in "non-hypertensive and non-diabetic patients", particularly in those with a recent ischemic stroke. Ischemic stroke is considered as that kind of stroke which is taking place when a blood vessel is being blocked in the human brain, leading to reduced blood flow and damage to brain cells. Ischemic stroke is a major cause of death and disability worldwide and there is a need for better predictors of CVD in this patient population.

Concept of Microalbuminuria

Table 1: Causes and effects of Microalbuminuria

Causes	Effects
Impact of an increase of Microalbuminuria	Urinary albumin that is higher than the standard value
Sudden increase of Microalbuminuria	Increase in the chance of sudden heart attack

(Source: Influenced by 5)

Table 1 describes the causes and effects of microalbuminuria which is making the person face a sudden heart attack. Microalbuminuria (MA) is an amount of urinary albumin that is higher than the standard value, but also lesser than the amount identified by a predictable measuring scale.

Thus, the amount of urine albumin emission in Microalbuminuria is higher [5]. This work of the examination outlines the Aetiology, examination, and management of Microalbuminuria. It elaborates on the future possible consequence of microalbuminuria without interference. That Includes, it places of interest the significance of the internal specialized team's role in the broadcast, administration, and remedy of this disease and its side effects to develop the patient's health condition.

Effects of Microalbuminuria among the Humans of the World: The disease of diabetes and hypertension became common among the mass

of the people. It continued its spread among the adults as well as the children of the world. Microalbuminuria is a sign of universal common malfunction and is considered as an ordinary way of a wound to both internal and external damage of the human body [7]. The succession of Microalbuminuria is combined by conventional systematically changes in the Glomerulus together with the decrease and hurting of the Podocyte. This effecting as damage to the internal and the external organ as well as the blood vessels.

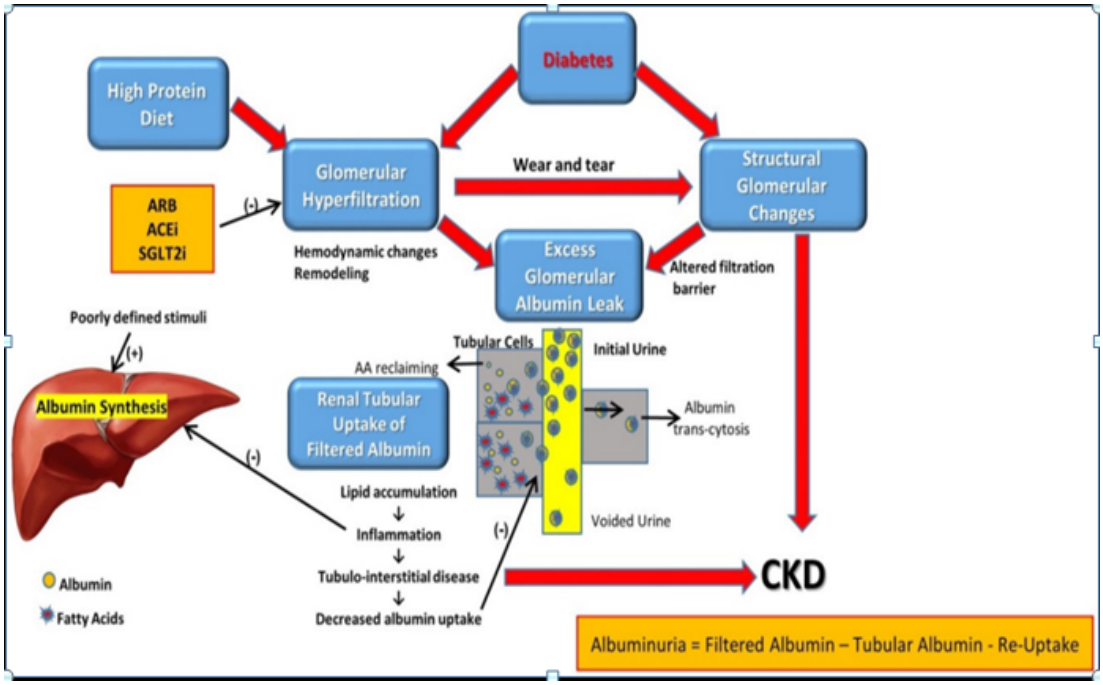

Figure 2: Effects of Microalbuminuria among the Humans
(Source: Influenced by 7)

Figure 2 has clearly illustrates the effects of Microalbuminuria within human body by different ways. Microalbuminuria is a significant predictor of CVD in non-hypertensive and non-diabetic patients with recent ischemic stroke. In a study of 196 patients with recent ischemic stroke who were "non-hypertensive and non-diabetic", 41.8% had microalbuminuria [2]. Those with microalbuminuria had a significantly higher risk of CVD, including stroke, myocardial infarction, and cardiovascular death, compared to those without microalbuminuria. The presence of microalbuminuria was also associated with an increased risk of all-cause mortality. The significance of microalbuminuria as a predictor of CVD in "non-hypertensive and non-diabetic patients" with recent ischemic stroke lies in its ability to identify patients who are at high risk of CVD and who may benefit from targeted interventions to reduce their risk [1]. Early identification of patients with microalbuminuria can lead to the implementation of strategies to prevent or delay the onset of CVD, such as lifestyle modifications, pharmacological interventions, and blood pressure and lipid control.

Causes of Microalbuminuria

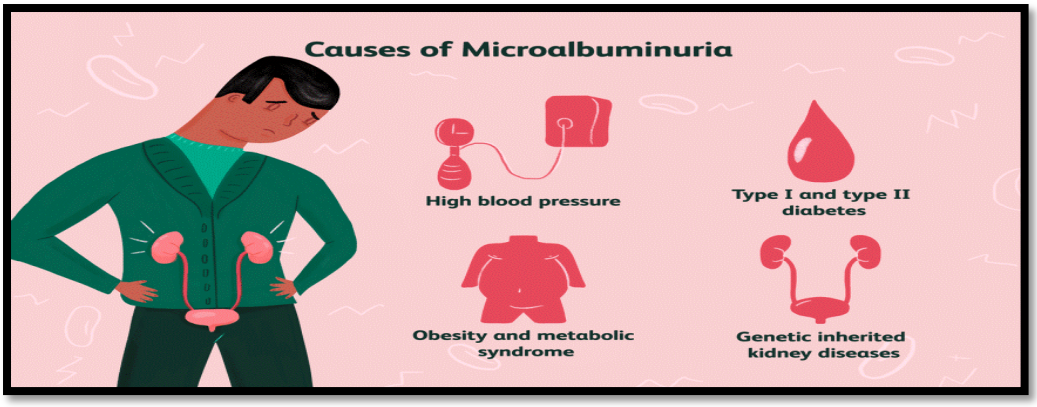

Figure 3: Causes of microalbuminuria
(Source: Influenced by 9)

Figure 3 has depicted different causes of Microalbuminuria in human body. The effects of microalbuminuria major effect on the internal and external organs of the human body. Some of the internal factors of the human body make the generation of diseases some of them acts as damaging factors in the internal portions of the body [9]. The dysfunctions of the kidney and the generation of diabetic cells cause the increase of the diseases. The rapid increase of the disease in the internal parts of the body makes damage of the organs and they perform in the way of deterioration of the health condition of the human thus making the person ill.

Impact of Microalbuminuria in the Non-Diabetic Patients: Microalbuminuria is associated with an increased risk of CVD in non-diabetic patients. In a study of 15,729 adults without diabetes, those with microalbuminuria had a higher incidence of CVD than those without microalbuminuria [5]. Furthermore, microalbuminuria was found to be an independent predictor of CVD after adjusting for other risk factors such as age, gender, blood pressure, smoking status, and lipid levels. In addition to being a predictor of CVD, microalbuminuria has also been associated with an increased risk of all-cause mortality in non-diabetic patients. A study of 5,021 non-diabetic individuals found that those with microalbuminuria had a higher risk of all-cause mortality than those without microalbuminuria [10]. The study also found that the risk of mortality increased as the level of microalbuminuria increased.

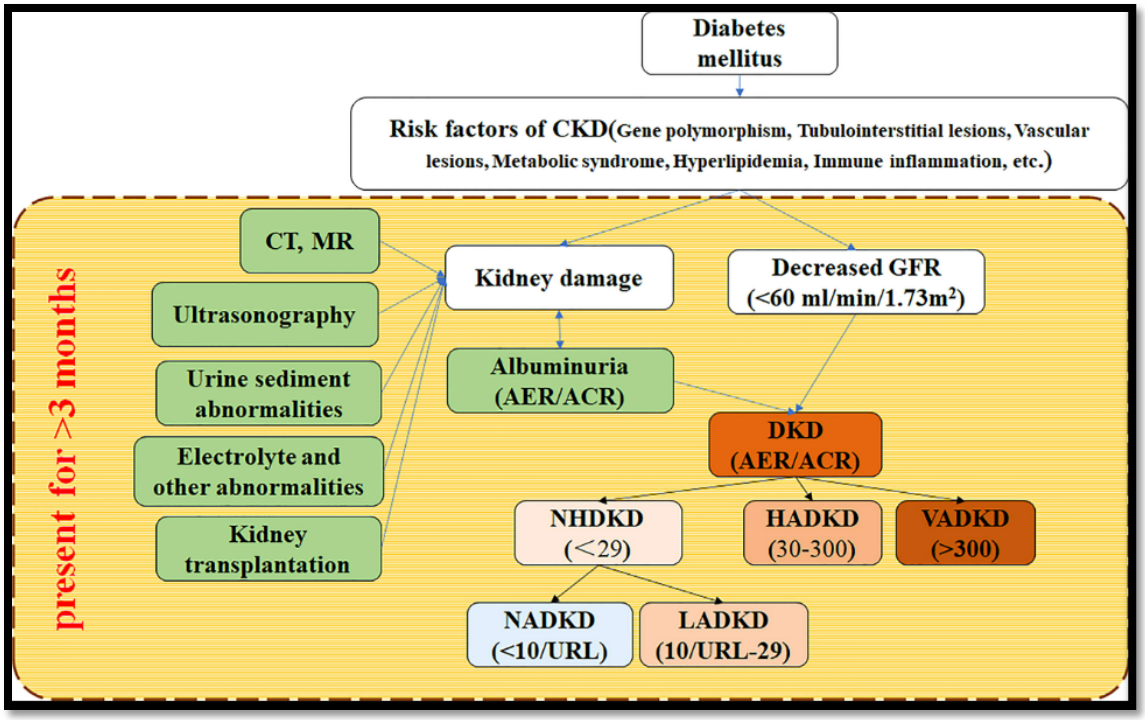

Figure 4: Microalbuminuria in the Non-Diabetic Patients
(Source: Influenced by 6)

The figure 4 depicts the "diagnosing NADKD according to KDIGO 2012 clinical practice guideline". In the case of non-diabetic patients, the increase of the disease Microalbuminuria makes damage of the internal blood vessels and the blood particles. In non-diabetic patients, the amount of sugar level in the urine of the person increases. The increases in the sugar level make increase of drowsiness and stress of the individual.

The insulin level of humans decreases [6]. Sometimes this leads to the creation of a huge malfunction of the internal organs of the person. Thus makes the increase of the chance of sudden heart attack and other heart diseases. Therefore it makes the person moves towards becoming more affected by diabetes. The impact of microalbuminuria on non-diabetic patients extends beyond CVD and mortality [1]. It has also been associated with the development of chronic kidney disease (CKD). A study of 2,880 non-diabetic individuals found that those with microalbuminuria had an increased risk of developing CKD compared to those without microalbuminuria. The study also found that the risk of CKD increased as the level of microalbuminuria increased.

Impact of Microalbuminuria in the Hypertensive Patients: In the case of the hyper tense patients make damage of the internal organs like the kidneys and the heart. These diseases in hypertension are elaborated as an early

identification of damage in the kidney and an interpreter for the last stage in the kidney disease and cardiovascular disease [1]. Thus makes the increase of the values of the keratin amount of the patient. This results as the major factor in making the uneven function of the body in making the filtration of the liquid.

The malfunction of the kidney in the internal function of the body makes the increase of other organ's dysfunction. One of the organs that gets directly affected by this is the heart so this make the increase of heart disease in the patient and can also cause a heart attack. Hypertension is a well-established risk factor for CVD, and the presence of microalbuminuria in hypertensive patients further increases their risk of CVD. A study of 1,012 hypertensive patients found that those with microalbuminuria had a higher incidence of CVD than those without microalbuminuria. The study also found that the risk of CVD increased as the level of microalbuminuria increased. Microalbuminuria is also a predictor of CKD in hypertensive patients. A study of 1,394 hypertensive patients found that those with microalbuminuria had a higher risk of developing CKD than those without microalbuminuria.

The study also found that the risk of CKD increased as the level of microalbuminuria increased. In addition to being a predictor of CVD and CKD, microalbuminuria has also been associated with target organ damage in hypertensive patients. Target organ damage refers to damage to the heart, brain, kidneys, and blood vessels caused by hypertension. A study of 4,630 hypertensive patients found that those with microalbuminuria had a higher prevalence of target organ damage than those without microalbuminuria. The study also found that the prevalence of target organ damage increased as the level of microalbuminuria increased.

Methodology used to estimate microalbuminuria: Urine collections for 24 hours, overnight, and spot testing have been utilized in clinical research on adults and children to determine UAE. When it comes to spot urine testing for UAE estimation, timed urine samples are typically more laborious for the pediatric population. Urine albumin concentration or albumin creatinine ratio determination from spot urine samples are straightforward substitutes. It has been demonstrated that an albumin-to-creatinine ratio >10 mg/g, which is superior to urine albumin concentration and comparable to 24-hour urine collections, is a better indicator of microalbuminuria [11, 12]. In adults, the use of the albumin-to-creatinine ratio particularly in the general population has been validated in a number of epidemiological research [13–15] whereas in children there is relative paucity of such studies [16]. It is advised that diabetic subjects do the test three times a year because to a greater range of variance in UAE in youngsters, even within the normal range [17]. In healthy youngsters older than six years old, the average albumin-to-creatinine ratio appears to range from 8 to 10 mg/g (7.5 mg/g for males and 9.6 mg/g for females) [18]. Exercise [19] and the time of day [20] have an impact on UAE; therefore, an early morning urine sample for the albumin creatinine ratio offers a more accurate assessment of microalbuminuria. UAE is thought to be lowest in children under the age of six, increasing during adolescence and peaking between the ages of 15 and 16 [16, 18]. Height, weight, Tanner stage 4-5 of puberty, and female gender [21, 22] are all linked to a higher albumin excretion rate in youngsters in good health. Cross-sectional studies of healthy teenagers have similarly revealed increased albumin excretion in children of African American heritage [23].

According to data released from the third National Health and Nutritional Examination Survey (NHANES) [24], the prevalence of microalbuminuria was 7.8% (6.1% in males and 9.7% in females) in a sample of 22,244 subjects aged 6 to >80 years, with a progressively rising prevalence in adults over 40. Microalbuminuria was found to be nearly twice as common in 6–19 year olds (15%) compared to adults aged 20–39 (7.3%), which is in contrast to the trend in adults. Additionally, girls aged 6 to 19 had prevalence rates that were comparable to those of women aged 60 to 79, and even higher than those of their male counterparts. In addition, a cross-sectional study of NHANES data for adolescents aged 12 to 19 [25] revealed that, in contrast to healthy controls, overweight teens had a reduced prevalence rate of microalbuminuria even in the presence of cardiovascular risk factors. Although it was little, there seemed to be a strong correlation between the existence of diabetes, insulin resistance, and hypertension in the group of obese kids with microalbuminuria. Although the cause of the decreased incidence of microalbuminuria in obese teenagers is unknown, it's possible that their lower levels of exercise reduce the confounding effect of orthostatic proteinuria [26]. Contrary to adult findings, few investigations have demonstrated a positive correlation between obesity and microalbuminuria [27, 28]. As predicted, children with diabetes have a five-fold higher prevalence of microalbuminuria [24].

The potential confounding influence of orthostatic proteinuria is a clear reason for the apparent increase in the prevalence of microalbuminuria in healthy teenagers. According to reports, this affects 20% of male adolescents [29], rises during adolescence, and then tends to naturally settle about age 20 [30]. When left untreated, orthostatic

proteinuria is a benign illness that carries no long-term risk of renal disease [31, 32]. However, it may conceal underlying primary kidney disease [33].

In the majority of postural proteinuria patients, imaging tests reveal entrapment of the left renal vein in the fork between the aorta and proximal superior mesenteric artery [34, 35]. We refer to this as the "nutcracker phenomenon." When the left renal vein is partially obstructed when standing, the glomerular trans-capillary hydraulic pressure difference rises, and the efferent arteriolar resistance rises as well, increasing the UAE. Angiotensin II plays a role in mediating these hemodynamic alterations [36]. It is therefore vital that orthostatic proteinuria is evaluated during examination of children and adolescents with microalbuminuria.

Remedies of Microalbuminuria: Treatment of microalbuminuria in "non-hypertensive and non-diabetic patients" with recent ischemic stroke should focus on the identification and treatment of risk factors for CVD, such as hypertension, dyslipidemia, smoking, and obesity [2]. Here are some remedies for microalbuminuria:

1. Lifestyle modifications: Lifestyle modifications such as a healthy diet, regular exercise, and weight loss can help prevent and manage microalbuminuria [3]. A diet low in sodium, saturated and Trans fats, and simple sugars is recommended. Patients should be encouraged to engage in regular physical activity and maintain a healthy body weight.

2. Blood pressure control: Blood pressure control is important in the prevention and management of microalbuminuria. Patients should have their blood pressure monitored regularly, and if it is high, they should be treated with an "ACE inhibitor or an angiotensin receptor blocker (ARB)" to reduce their risk of CVD [8].

3. Lipid control: Dyslipidemia is a risk factor for CVD and should be treated in patients with microalbuminuria. Patients with elevated LDL cholesterol levels should be treated with a statin to lower their risk of CVD.

Table 2: Diseases and Remedies of Microalbuminuria

Diseases	Remedy
Dysfunction of kidney	Regular monitoring of the keratin amount
Heart diseases	Popper maintenance of the health conditions and reducing stress.

(Source: Influenced by 10)

The increase of diseases makes the increase of damage of the internal organs and the internal blood vessels. The diagnosis known as albumin to Creatinine ratio (ACR) can diagnose the disease Microalbuminuria and identifies the disease as fast as possible [6]. The ACR test calculates the proper functioning of the kidney. It makes the comparison of the amount of albumin in the urine with the quantity of Creatinine. Creatinine is the unused material made by the muscles present in the body. The collection of urinary sample needs to be collected usually first thing in the morning. Then after that will be sent for diagnosis and the result will help to monitor for the better health condition.

Implications

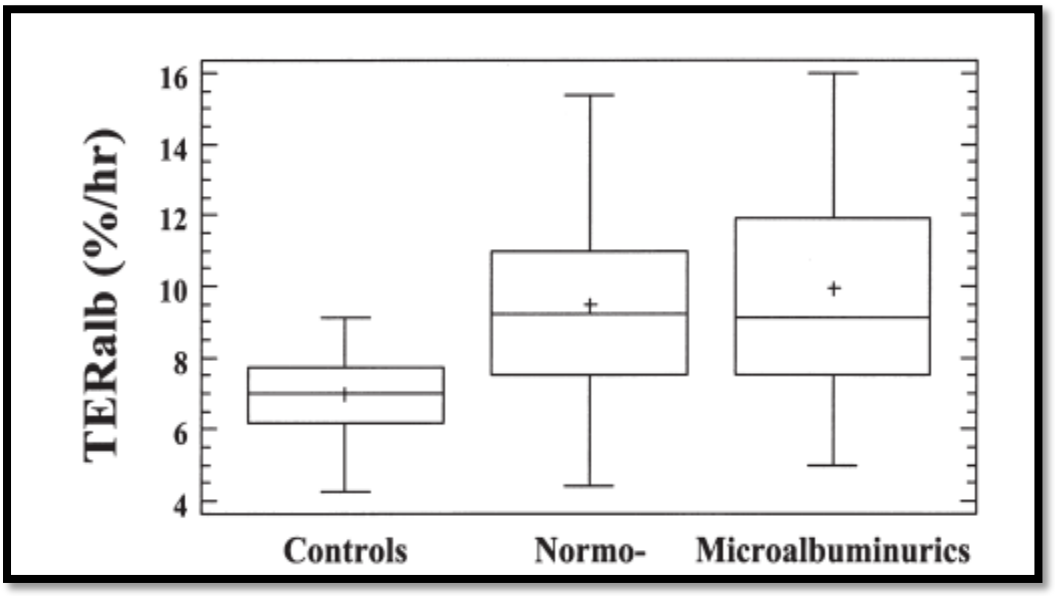

Figure 5: Albumin Transcapillary

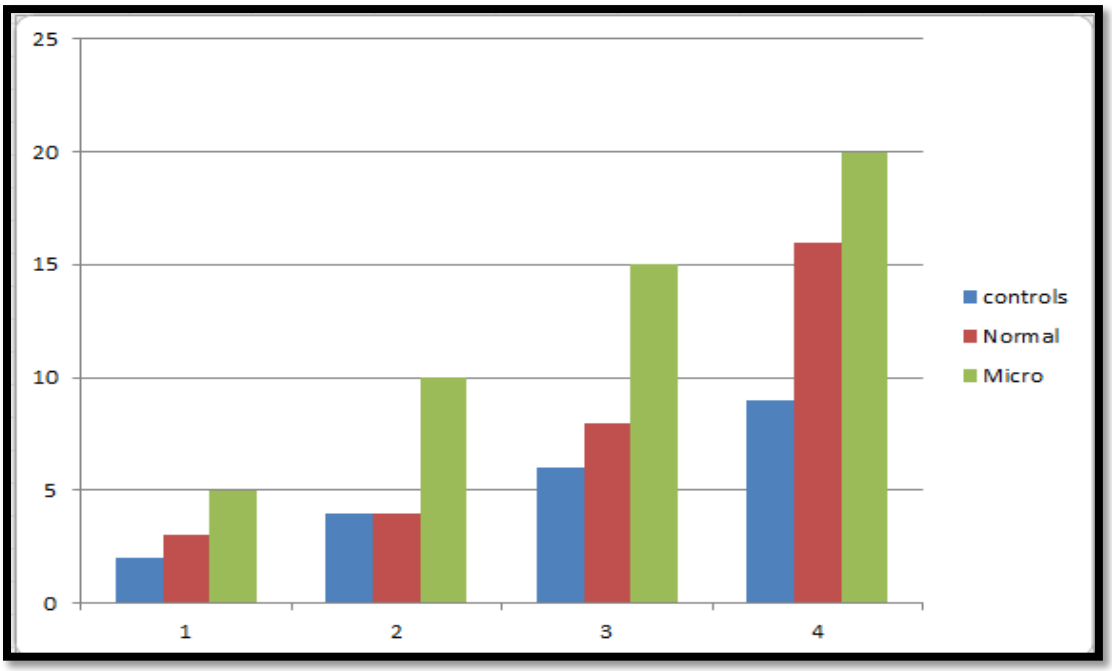

Figure 6: The bar chart of percentage in TERalb

Figure 5 and Figure 6 demonstrates that "Comparable transcapillary" escaping rates of 125I-albumin (TERalb) in normo- (n = 53) as well as micro- (n = 20, UAE 15 g/min) albuminuric individuals with primary hypertension. Data from controls (n=21) that were matched for both gender and age is additionally presented. The disease of Microalbuminuria has increased majorly among the diabetic and non-diabetic populations of the mass. This makes an increase of heart and kidney diseases.

The making of the diseases makes increase of the chances of humans facing sudden heart failure has not been specified in many studies [10]. This study shows the issues faced by humans and the mitigating steps that can be followed by humans. The prevention and management of microalbuminuria in non-hypertensive and non-diabetic patients with recent ischemic stroke should focus on the identification and treatment of risk factors for CVD, such as hypertension, dyslipidemia, smoking, and obesity. Lifestyle modifications, such as a healthy diet, regular exercise, and weight loss, should be encouraged in all patients [4]. Pharmacological interventions, such as ACE inhibitors and statins, should be considered in patients with hypertension and dyslipidemia, respectively, to reduce the risk of CVD. Blood pressure and lipid control are important in the prevention and management of microalbuminuria. In a study of 116 non-hypertensive and non-diabetic patients with recent ischemic stroke and microalbuminuria, blood pressure control with an ACE inhibitor significantly reduced the risk.

Consequently, a large glomerular endothelial glycocalyx suggests that the glomerular endothelium plays a major role in the barrier against macromolecules [37, 38]. This view is undoubtedly supported by experimental findings. Glycocalyx-degrading enzyme-treated mice have decreased glomerular endothelial glycocalyx thickness corresponding with higher excretion of albumin [39]. Albumin is restricted to the glomerular capillary lumen and endothelial fenestrae in rats under normal perfusion conditions, suggesting resistance at the glomerular endothelium surface level [40]. The proper anatomical distribution of endothelial glycocalyx, which can be seen on the surface of endothelial cells and in fenestral apertures, explains this distribution. Reactive oxygen species (ROS), which are known to disrupt the glycocalyx [41], generate severe proteinuria without any apparent structural alterations in the GFB using normal electron imaging techniques [42]. Remarkably, a recent study demonstrated that proteinuria can result from breakdown of the glomerular endothelial glycocalyx caused by ROS generation [43]. Moreover, in vitro studies have directly confirmed the glycocalyx of human glomerular endothelial cells' capacity to create a permeability barrier to macromolecules [38].

Structural and functional alterations in GFB associated with microalbuminuria: Although by the time microalbuminuria manifests itself, the glomerular structural abnormalities characteristic of glomerular disorders such as diabetic nephropathy are usually established [44], these alterations are variable and have been reported in patients without

microalbuminuria [37]. Increased glomerular size, thickness of the GBM, mesangium growth, and effacement of podocyte foot processes are examples of early alterations [44]. The enlargement of glomerular capillaries as a result of hemodynamic alterations and mesangial expansion are both responsible for the rise in glomerular size. In type 2 diabetes, glomerular structural alterations are less pronounced; only one-third of cases follow the traditional pattern found in type 1 diabetes [45].

Podocyte injury is indicated by the effacement of podocyte foot processes, however protein excretion cannot be reliably predicted from this signal alone. Undoubtedly, proteinuria can develop in podocytes even when there are no structural alterations [46]. This is especially true for diabetic microalbuminuria linked to type 2 diabetes, in which the ultrastructure of podocytes may not alter [47]. A plausible reason to address this problem could be that podocyte loss happens later in the disease process, but mesangial and endothelial cell counts rise in the early stages of the disease.

The theory put out, which was covered in the preceding part, is that the glomerular endothelial glycocalyx is in a good position to be involved in the pathophysiology of microalbuminuria. There is growing evidence that acute hyperglycemia in humans reduces the overall systemic glycocalyx volume [48]. Additionally, the start of microalbuminuria and lower systemic glycocalyx volume are observed in type 1 diabetics [49]. Without a change in composition, GBM thickening alone has little effect on the protein permeability properties of the material.

Experimental models can confirm increased albumin passage across the GFB in diabetic microalbuminuria. To determine whether the increased albumin flux is the result of the GFB's loss of size selectivity or charge selectivity, a thorough examination of its permeability properties to molecules with different sizes and charges has been conducted. The main impairment in diabetes animal models appears to be charge selectivity [50], while loss of both charge and size selectivity of the GFB is observed in healthy non-diabetic persons with microalbuminuria [51]. Defects in charge-selectivity appear before loss of size selectivity in both type 1 and type 2 diabetes [47, 52].

Conclusion

It can be concluded that the possible consequence of microalbuminuria without interference. That Includes, it places of interest the significance of the internal specialized team's role in the broadcast, administration, and remedy of this disease and its side effects to develop the patient's health condition. It shows all the possible outcomes of the diseases and the remedies of the diseases.

Microalbuminuria is a condition that can have significant impacts on both non-diabetic and hypertensive patients. It is a predictor of CVD, all-cause mortality, and CKD in both patient populations. In hypertensive patients, it is also associated with target organ damage. It is important for healthcare providers to be aware of the impact of microalbuminuria and to monitor patients with this condition closely to prevent or delay the onset of CVD, CKD, and target organ damage.

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