

ORAL ASPECTS OF CHRONIC RENAL FAILURE

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ABSTRACT

Diseases such as diabetes mellitus, hypertension, chronic glomerulonephritis, uropathy and autoimmune diseases are considered the most frequent causes of renal failure.¹² The aim of this study was to investigate oral manifestations caused by chronic renal failure.

Oral manifestations of chronic renal failure include dysgeusia, stomatitis, decreased salivary flow rate, xerostomia and parotitis; moreover, dental oriented conditions include narrowing of pulp chamber, enamel abnormalities, tooth loss and periodontal disease.¹² The most frequent dilemma in patients with Kidney failure is Renal Osteodystrophy.¹¹

Chronic renal failure could be treated by renal replacement therapy, hemodialysis and peritoneal dialysis.^{11,12} These are methods of removing nitrogenous and other toxic byproducts of metabolized blood.^{6,12} Oral maladies due chronic renal failure occur because of immunosuppressive medications.^{11,12} However, this kind of therapy could be challenging as it causes gingival inflammation due to increased plaque deposition; which in turn affects the periodontal tissues.⁶ A good oral hygiene may reduce the risk of oral infections in chronic renal failure patients.⁶ The awareness about kidney related diseases is often neglected; however, the number of patients with oral manifestations related to chronic renal failure is miraculous.

Key Words: Chronic glomerulonephritis, xerostomia, oral tribulations, chronic renal failure.

INTRODUCTION

The oral manifestations of renal insufficiency have been of interest to oral physicians for quite some period of time. Dentists all over the world especially in developed countries like US, UK and Sweden have done research to find the association between chronic renal failure and oral diseases.²⁰ This review article elaborates the impact of chronic kidney disease on oral health and its progression during and after the treatment.

Kidney's four chief functions are to control waste products and drugs (excretory), maintain homeostasis

through water and electrolytes (regulation), regulates blood pressure through production of renal (endocrine) and finally plays an important role for the metabolism of vitamin D and as well serve an active site for the catabolic processes of hormones.²⁰ The renal failure is mostly due to the decrease in glomerular filtration rate (GFR). The consequences are high blood pressure, weight loss, anemia, neuropathy and osteodystrophy.²⁰ Diabetes mellitus, glomerulonephritis, renovascular, polycystic disease and hypertension are the main underlying reasons for chronic renal failure caused by decreased glomerular filtration rate GFR.¹⁶

The chronic renal failure overall affect body systems and early symptoms are nocturia, polyuria and anorexia. There is discoloration of nails, weakness, weight loss, hypertension, bruising etc. All these symptoms combined together are clinically termed as uremia.¹⁶

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The treatment includes dietary restriction (low potassium and low protein), dialysis and lastly transplantation.¹⁶ Renal failure and impairment affects hard and soft tissues of the mouth. It includes periodontal diseases, gingival enlargement, xerostomia (dry mouth), bad taste/odor, uremic stomatitis (white plaques that results in lichen planus or hairy leukoplakia), dental anomalies (narrowing of pulp chamber) and bone lesions.¹⁹ Also it includes tooth mobility, bone loss and mandibular and maxillary fractures. The statistics show that only 15% of hemodialysis patients show good hygiene.¹⁹

After the transplantation concurrent medical treatments such as immunosuppressant are given that lead to other structural changes such as gingival hyperplasia, gum hypertrophy, ulceration, fungal infection such as oral candidiasis.¹⁹

The oral health affected by renal failure could impact anyone ranging from children to adults.¹⁷ Dental surgeons with their immense research are making considerable contribution to the general health and well being of mankind suffering with oral health related problems due to chronic renal failure. The good oral hygiene, professional cleaning and detection of oral pathology will improve patient's condition.¹⁶

SIGNS AND SYMPTOMS OF CHRONIC RENAL FAILURE

The early signs of chronic renal failure are subtle. Kidney disease can take up to years to reach to kidney

failure (in fact the whole life time of the patient suffering with chronic renal diseases). Chronic renal failure can be present for long time before people tend to notice any symptoms. The symptoms that can easily be detected especially by the patient him/herself at the initiation of chronic renal disease are increased urination, decreased urination, blood in the urine and urine that is cloudy or tea-colored. Other symptoms aren't obvious, but are a direct result of the kidneys' inability to eliminate waste and have to be clinically tested.

ASSOCIATION BETWEEN ORAL LESIONS AND RELATED THERAPY

Oral health is the chief concern that this review article tends to underline. Statistics show that 90% of the patients suffering from chronic renal failure face oral health related problems because it affects the bone and soft tissue structures,^{1,5,6,12,19,20} and thus can effect periodontal tissues.

Problems are as follows:

- Bad odor/metallic taste due to increased concentration of urea in saliva and its transformation into ammonium.
- Xerostomia: dry mouth resulting from restriction of fluid intake and salivary gland alteration.
- Paleness of the mucosal members due to anemia.
- Uremic stomatitis: The four types are erythematous, ulcerative, hemorrhagic and hyperkeratotic.

TABLE 1: TYPES OF RENAL FAILURE⁵

Type of Renal Failure	Causes
Acute (Pre-renal)	Gastrointestinal losses, Excessive perspiration, Bleeding, Burns with, fluid sequestration, Renal losses, Cardiovascular failure, Liver failure.
Acute (Intrinsic)	Acute tubular necrosis, Severe cortical necrosis, Severe acute, glomerulonephritis, Vasculitis, Malignant hypertension, Accelerated, scleroderma, Allergic interstitial nephritis.
Acute (Post renal)	Bilateral ureteral obstruction in patients with a single kidney, Bladder obstruction, Bladder rupture, Urethral obstruction.
Chronic Renal Failure	Chronic immune glomerulopathy, Hypertensive nephrosclerosis, Chronic tubulointerstitial diseases, Metabolic diseases (e.g., diabetes mellitus), Congenital and hereditary renal processes (e.g., renal polycystic disease).
ESRF	Appears when Chronic renal failure reaches its end stage. Hyperfunction of the remaining nephrons, systemic hypertension, the progression of immune damage, proteinuria, and protein and fat dietary loading.

eratotic. Appears on the ventral surface of the tongue and on the anterior mucosal surfaces.

- Gingival bleeding due to platelet dysfunction and the affects of anticoagulants.
- Gingival inflammation due to immune suppression and uremia.
- Gingival hyperplasia: Oral manifestations in patients with chronic renal failure and can be induced by cyclosporine. Switching cyclosporine to tacro-limus can reduce the affects gingival hyperplasia. Hyperplasia affects the labial surface of the inter-dental papilla, gingival margins and palatal surfaces.
- Periodontal problems.
- Enamel hypoplasia – Referred as alterations in calcium and phosphorus metabolism.
- Erosions on the surface of the teeth because of acidic regurgitation and vomiting induced by uremia.
- Pulp obliteration due to calcium and phosphorus metabolism.
- Delays in eruptions.
- Changes in Maxillary bone and these changes comprise bone demineralization with trabeculation, cortical loss, giant cell radiotransparencies or metastatic calcifications of the soft tissues.
- Increased risk of fracture when suffering from chronic renal disease while doing other treatments such as extractions, tooth mobility etc.
- Diminished prevalence of caries which inhibits bacterial growth and neutralizes bacterial plaque acids.
- Formation of tartar due to increased level of urea in saliva.
- Infections such as candidiasis, cytomegalovirus etc.
- Mucosal lesions – ulcerations, white lesions etc.
- Malignization- effects of iatrogenic immune suppression that leads to tumors.

Oral health concern states that it is also dependent on behavioral and genetic factors. Factors such as age, gender, nutrition, socioeconomic factors, hygiene habits for the teeth, and immune response play major role in the lives of people suffering from chronic renal failure. Ages 55-70 - person is most likely to suffer from chronic renal failure and due to that is likely to face major oral health concerns. Males face worse oral health concerns than females. This issue may be due to poor oral hygiene, changes in dietary habits, lack of primary defense or medical conditions. Dental decay is constant due to leakage of urea and ammonia as they increase the pH of the saliva.

THE CORRELATION BETWEEN PERIODONTITIS AND CHRONIC RENAL FAILURE

Periodontium consists of the gingiva, periodontal ligament, root cementum and the alveolar bone. Periodontal diseases are considered as inflammatory diseases that spread across affecting the basic parts of the periodontium and thus considered as periodontitis. It is an infectious disease resulting in inflammation within of the tissues supporting the teeth, progressive loss of attachment and bone loss. Periodontitis cause the rise of indirect local agents (dental calculus). It is said that the main root cause of this disease is due to lack of oral hygiene, due to which plaque which is a natural bio-film appears on the tooth surface or any hard object in the oral cavity within 24 hours is not removed or cleaned properly can easily be converted to calculus due to minerals secreted in saliva adhere to dental plaque and solidifies them to become a harden calculus. This calculus if not removed cause destruction in periodontium and a series of periodontal problems initiates.

Periodontal diseases lead to local tissue destructive. Due to that several acute phase (AP) proteins trigger an inflammatory cascade in plasma. Pentraxins are such classical AP proteins in local health and are markers of inflammation. They are produced in response to inflammatory conditions and play a major role in innate immune system. There are two major groups of pentraxin short (CRP) and long (PTX3).^{2,15}

Different studies predict that periodontitis causes the overt nephropathy with little or no preexisting

kidney disease after adjustment for age, sex, duration of diabetes, BMI, and current smoking. The level of hyperglycemia may be a confounder because it is a known risk factor for kidney disease and is associated with periodontitis.¹⁸

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