



CHRONIC KIDNEY DISEASE AND ORAL HEALTH: A REVIEW

Dental Science

Dr. Lokesh Sharma*	PG Student, Dept. of Public Health Dentistry, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow.*Corresponding author
Dr. L. Vamsi Krishna Reddy	Prof. & Head, Dept. of Public Health Dentistry, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow.
Dr. Sabyasachi Saha	Secretary, Dental Council of India.
Dr. Pooja Sinha	Reader, Dept. of Public Health Dentistry, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow.
Dr. Abhishek Verma	Senior Lecturer, Dept. of Public Health Dentistry, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow.
Dr. Devina Pradhan	PG Student, Dept. of Public Health Dentistry, Rama Dental College Hospital & Research Centre, Kanpur.

ABSTRACT

Chronic kidney disease (CKD) is a worldwide health problem, with adverse outcome of cardiovascular disease and premature death. It has become evident that inflammation plays an important role in the pathogenesis of atherosclerosis complication. Chronic kidney disease patients also have an increased risk of atherosclerosis complication. In line with this, dental problems can be important source of systemic inflammation. In the developed and developing countries, oral health care in CKD patients is neglected. There is poor dental awareness amongst the patients and healthcare delivery personnel. As the oral health in dialysis and transplant patients is poor, so it makes them more likely to develop pathological conditions in the oral cavity, potentially increasing morbidity, mortality and affecting the quality of life of patients. Gingivitis and periodontitis are common manifestations of poor oral health. In addition, poor oral health in CKD patients is an important contributory factor in atherosclerosis, protein energy wasting, systemic infection and inflammation. Therefore, the dentist plays an important role in training parents and/or guardians, doctors and paramedics on the treatment of oral lesions in these patients.

KEYWORDS

Chronic kidney disease, Oral health, Gingivitis, Periodontitis

Introduction

World Health Organization (WHO) defines oral health as a stage of being free from mouth & facial pain, oral & throat cancer, oral infection & sores, periodontal disease tooth decay, tooth loss & other disease and disorder that limit an individual's capacity in biting, chewing, smiling, speaking and psycho social wellbeing.¹

Oral health and general health are interlinked. The mouth acts as a window to the general health of the body. Bacteria from mouth can cause infection in the other part of the body when the immunity of the host is impaired by disease or medical treatment. Systemic inflammation and treatment also affect the oral health as xerostomia, altered balance of oral microorganisms.^{2,3}

Chronic Kidney Disease (CKD) is defined as kidney damage for 3 or more months associated with structural or functional abnormalities of the kidney with or without decreased Glomerular Filtration Rate (GFR). CKD is a public health problem with high impact on the quality of life. The literature available showed that the incidence of end stage kidney disease as 229 per million of population in India.⁴

Chronic kidney disease is a worldwide health problem, with adverse outcome of cardiovascular disease and premature death. It has become evident that inflammation plays an important role in the pathogenesis of atherosclerosis complication. Chronic kidney disease patients also have an increased risk of atherosclerosis complication. In line with this, dental problems can be important source of systemic inflammation.⁵

CRP (C-reactive protein) may not be merely a marker of inflammation but may in fact mediate several key processes in the development of atherosclerosis including plaque initiation, formation and rupture.

CKD patients have associated oral problem arising from the disease

process or the effect of therapy or both. Untreated oral lesion may deteriorate the clinical presentation and prognosis. There are clinical and radiological changes in the mouth in CKD patient. Some studies have reported higher incidence of oral lesion in dialysis patient with oral symptom of xerostomia, taste disturbance, uremic odor, tongue coating, mucosal inflammation, enamel hypoplasia.^{6,7}

Undiagnosed and untreated oral lesion in CKD may result in high graft rejection rate and increase in systemic inflammatory burden. The role of oral infection in worsening the systemic disease is not well established, however significant improvement in underlying systemic diseases have been observed after treatment of associated oral lesion. Oral health care is important in the management of CKD. In the developed and developing countries, oral health care in CKD patient is neglected. There is poor dental awareness among the patients and healthcare delivery personnel.^{8,9}

Gingivitis and periodontitis are common manifestations of poor oral health. Poor oral health in CKD patients is an important contributory factor in atherosclerosis, protein energy wasting, systemic infection and inflammation.¹⁰

Inflammation play an important role in causing various complications in CKD patient and inflammatory markers such as C-reactive protein,¹¹ pro and anti-inflammatory cytokines are sensitive and independent predictors of outcomes in CKD patient. Poor oral health could result in stimulation of inflammation and cytokine stimulation. This could result in production of donor specific anti HLA antibodies which could cause rejection.¹² At present oral health evaluation of a prospective kidney transplant recipient before transplantation is not routinely done. There is need to evaluate the benefit of good oral hygiene and its effect on renal transplant outcome.¹³

Chronic Kidney Disease – Mineral Bone Disorder (CKD-MBD)

In renal disease, the controlling mechanisms of bone and mineral factors become unstable. Bone abnormalities, calcification and deranged mineral metabolism are now thought to be part of the same disease spectrum in renal patients. The term CKD-MBD is used to describe the clinical systemic disorder involved by these abnormalities. This syndrome is described as establishing one or a mixture of the following:^{14,15}

- 1) Abnormalities in bone turnover, mineralisation, volume, linear growth, or strength.
- 2) Vascular or other soft tissue calcification.
- 3) Abnormalities of calcium, phosphate, PTH (Parathyroid hormone) or vitamin D metabolism

The abnormalities of mineral metabolism ultimately lead to the formation of secondary hyperparathyroidism (SHPT) which is a common complication of renal disease and its pathogenesis is multifactorial.

Three main changes occur when kidney function drops in CKD:

- 1) Loss of renal function leads to less 25(OH) vitamin D converted by 1 α -hydroxylase resulting in a decrease in 1.25(OH)₂ vitamin D levels. This active vitamin D has been shown to start a linear decline early in CKD.² This decline continues and occurs before any rise in PTH.
- 2) An increase in phosphate burden develops due to the decreasing eGFR.
- 3) Reducing urinary phosphate excretion. There is also decrease in serum calcium levels.

This is due to low dietary calcium intake but mainly the low 1.25(OH)₂ vitamin D level leading to less intestinal calcium absorption and reduced renal clearance. Finally, this leads to a lower serum calcium level which stimulates the parathyroid glands to release more PTH to regulate the serum calcium concentration. As the parathyroid gland exerts most of its effect through action on the kidney, its effect is impaired in CKD. This is attached with a down regulation of the PTH receptor in CKD important to skeletal resistance to PTH.

Conclusion

In chronic kidney disease patients oral diseases may be increased due to associated inflammation and malnutrition. Oral disease could be at risk factor for cardiovascular diseases. There is worldwide increase in number of chronic kidney disease patients due to increase in diabetes mellitus. CKD patients suffer from oral disease such as gingival bleeding, gingivitis, periodontitis, plaque deposits, calculus accumulation and an increased risk of dentally induced bacterial endocarditis. Hence patients with CKD on dialysis require dental care, which is also very important after kidney transplantation. A good dental care could prevent endocarditis, septicemia and severe infections in these patients. By reducing inflammation and malnutrition good dental care could play an important role in preventing and controlling heart disease in CKD patients on dialysis and after transplantation.

Gingivitis and periodontitis are common manifestations of poor oral health. Poor oral health in CKD patients is an important contributory factor in atherosclerosis, protein energy wasting, systemic infection and inflammation.

Inflammation plays an important role in causing various complications in CKD patient and inflammatory markers such as C-reactive protein, pro and anti-inflammatory cytokines are sensitive and independent predictors of outcomes in CKD patient. Poor oral health could result in stimulation of inflammation and cytokine stimulation.

Thus, it is recommended that all patients on dialysis especially those going for transplantation should undergo dental check-up routinely. They should also be educated to undertake good oral and dental care while on dialysis and follow it up after transplantation.

References

1. Sanders AE, Slade GD, Lim S Et al. Impact of oral disease on quality of life in the US and Australian populations. *Community Dent Oral Epidemiol.* 2009; 37:171-81.
2. Parkar S, Ajithkrishnan C. Periodontal status in patients undergoing hemodialysis. *Indian Journal of Nephrology.* 2012;22(4):246-50.

3. Davidovich E, Schwarz Z, Davidovitch M, Eidelman E, Bimstein E. Oral findings and periodontal status in children, adolescents and young adults suffering from renal failure. *J Clin Periodontol.* 2005;32(10):1076-82.
4. Anuradha BR, Katta S, Kode VS, Praveena C, Sath N, Sandeep N, et al. Oral and salivary changes in patients with chronic kidney disease: A clinical and biochemical study. *J Indian Soc Periodontol* 2015; 19:297-03.
5. Klassen J, Krasko B. The Dental Health Status of Dialysis Patients. *J Can Dent Assoc.* 2002;68(1):34-38.
6. Craig R. Interactions between chronic renal disease and periodontal disease. *Oral Diseases.* 2007;14(1):1-7.
7. Naugle K, Darby M, Bauman D, Lineberger L, Powers R. The Oral Health Status of Individuals on Renal Dialysis. *Annals of Periodontology.* 1998;3(1):197-05.
8. El Nahas A, Bello A. Chronic kidney disease: the global challenge. *The Lancet.* 2005;365(9456):331-40.
9. Atassi F, Almas K. Oral hygiene profile of subjects on renal dialysis. *Indian J Dent Res.* 2001; 12:71-6.
10. Murthy A, Hiremath S. Assessment of Oral Health Status of Patients Undergoing Renal Dialysis in a Hospital at Bangalore City. *J Indian Assoc Public Health Dent.* 2005;5(5):35-8.
11. Menon V. et al. C-reactive protein and albumin as predictors of all-cause and cardiovascular mortality in chronic kidney disease. *Kidney International.* 2005; 68:776-72.
12. Perozini C, Ruivo G, Ricardo L, Pavesi L, Kim Y, Pallos D. Medical and Periodontal Clinical Parameters in Patients at Different Levels of Chronic Renal Failure. *International Journal of Dentistry.* 2017:1-6.
13. Nylund K, Meurman J, Heikkinen A, Furuholm J, Ortiz F, Ruokonen H. Oral health in patients with renal disease: a longitudinal study from predialysis to kidney transplantation. *Clinical Oral Investigations.* 2017; 1:1-7.
14. Bots C, Brand H, Poorterman J, Amerongen B, Valentijn-Benz M, Veerman E et al. Oral and salivary changes in patients with end stage renal disease (ESRD): a two-year follow-up study. *British Dent J.* 2008; 202:1-5.
15. Vesterinen M, Ruokonen H, Leivo T, Honkanen A, Honkanen E, Lindqvist C et al. Oral health and dental treatment of patients with renal disease. *Quintessence Int.* 2007; 38:211-19.