Poor oral health affects patients with chronic kidney disease- A review

Shaik Ali Hassan[1*], Sumit Bateja[2], Geetika Arora[3], Francis Prathyusha[4]

[1]Dental Surgeon, [2]HOD, [3]Reader, [4]BDS [1,2]Manav Rachna Dental College, Faridabad, Haryana, [3]Inderprastha Dental College & Hospital, Ghaziabad, Uttar Pradesh, [4]Dr. Francis Maxillofacial and Dental Clinic, India

***Corresponding Author: Shaik Ali Hassan**
Email: alishaikhassan@gmail.com

Abstract
Oral cavity problems like periodontitis and different signs of poor oral wellbeing, are regular in patients with chronic kidney disease (CKD) and may add to expanded disability and mortality in light of the fact that of foundational results, for example, irritation, diseases, protein-vitality squandering, and atherosclerotic entanglements. Poor oral wellbeing in CKD patients may along these lines speak to a significant, yet frequently ignored issue. A few examinations show that uremic patients have higher paces of rotted, missing, and filled teeth, loss of connection more, periapical and mucosal sores than everybody. The results of poor oral wellbeing might be progressively extreme in CKD patients as a result of cutting edge age, basic comorbidities, may expand the hazard for fundamental outcomes of periodontitis and other oral and dental pathologic conditions. In this article we will get to know about the oral cavity effect on CKD patients and ways to reduce the problem.

Keywords: Chronic kidney disease (CKD), Periodontitits, Uraemic disease, Haemodialysis.

Introduction
Cardiovascular ailment , which is frequently due to atherosclerosis, is the fundamental driver of death in patients with chronic kidney disease (CKD).[1,2] Various conventional, novel, and uremia-explicit hazard factors coincide in CKD and add to the expanded cardiovascular hazard in chronic kidney disease population.[1] Poor oral wellbeing, which is identified with age and diabetes mellitus, may comprise an under-perceived novel hazard factor, since late investigations have demonstrated how periodontitis partners with coronary illness and cerebrovascular sickness in everybody[3] just as in hemodialysis patients.[4] A conceivable clarification would include bacterial pathogens causing peridontitis, prompting aggravation as instigated by lipopolysaccaride coats and in this way activating atherogenesis, thrombus arrangement, and platelet conglomeration.[5] Be that as it may, periodontal maladies are treatable and modifiable hazard factors.[6,7] Moreover, novel connections between appearances of poor oral wellbeing and in chronic kidney disease is protein-energy wasting infections, and atherosclerotic inconveniences are being built up.

Oral problems in chronic kidney disease patient
Number of uremic metabolic, endocrinological, and reduction of immunity, CKD patients experience the ill effects of various fundamental inconveniences that may add to poor oral wellbeing.[8] In spite of the fact that there are no particular signs in the oral pit demonstrating the nearness of CKD.[9] an entire scope of changes happens in the oral depression that are related with CKD itself or with the CKD treatment.[10,11] Without a doubt, CKD has been accounted for to influence the teeth.[9,12,13] oral mucosa,[10,11,14] bone,[11,12] periodontium,[15,16] salivary organs,[17-19] tongue,[20,21] mouth hole,[22,23] and temporomandibular joint.[24,25] CKD patients are likewise regularly inclined to retrograde parotitis, which is accepted to result from a blend of direct organ inclusion, concoction irritation, reactions of medication treatment, drying out, furthermore, mouth breathing.[26] Patients with renal disorder regularly gripe of an alkali like awful scent, may be in view of the high urea content in spit and its resulting breakdown to ammonia salts. Expanded dental analytics has been watched, maybe as a result of a high salivary urea and phosphate levels.

A range of oral mucosal injuries, including white and erythematous patches and additionally ulceration, lichen planus-like malady, oral bushy leukoplakia, histopathologic ally comparative sores to Epstein-Barr infection, macules, knobs, and non-Hodgkin's lymphoma and additionally Kaposi's sarcoma, has been depicted in dialysis patients and in kidney transplant beneficiaries auxiliary to both medication related immunosuppression or a related medication.[17] The commonness of cyclosporin-instigated gingival hyperplasia in renal transplant patients changes from 22 to 58% in various reports and is increasingly regular in patients with expanded cyclosporin dose, in those with expanded dental plaque and gingival irritation, and in more young patients.[27] The rate of tacrolimus induced gingival hyperplasia in renal transplant patients is lower, by and large somewhere in the range of 0 and 15%.[28] An intraoral type of uremic frost that can be seen in untreated uremia comes about because of outstanding urea gems left on epithelial surfaces after salivation vanishing. Disintegrations of the dentition may happen as a result of disgorging coming about because of sickness.[29] The appearances of renal osteodystrophy in mandible, maxilla, what's more, the oral pit incorporate demineralization, diminished trabeculation, loss of lamina dura, radiolucent monster cell sores, macrognathia, metastatic delicate tissue calcifications, tooth portability, malocclusion, lacquer hypoplasia, and mash stones.[30-32]

Poor oral hygiene can cause inflammation
Gum disease (characterized as aggravation of the gingiva), periodontitis (aggravation of the gingiva in addition to supporting tissues of the teeth) are normal appearances of

poor oral wellbeing. Periodontitis speaks to a of aggravation, and during the development of periodontal pockets colonized with gram negative anaerobic microscopic organisms, an incendiary cell penetrate is enrolled into the sore that secretes pro inflammatory.[33,34] Both gum disease what's more, periodontitis is seen all the more habitually in ESRD patients.[35,36] Gingival hyperplasia is a generally normal periodontal inconvenience in renal transplantation patients that has been credited to cyclosporin measurement and the nearness of dental plaques, likely adding to gingival aggravation.[37]

Also, renal transplantation additionally improves salivary stream and diminishes manifestations of xerostomia and thirst.[38] A few potential reasons have been proposed to represent the poor oral wellbeing in uremia that has been related with in lymphocyte and monocyte work.[39] Modified cell insusceptibility alongside lack of healthy sustenance adds to an immunodeficient state in uremia. Uremic patients are increasingly inclined to bacterial diseases on account of hunger, which prompts a decreased capacity to deliver antibodies.[39] On the side of this, expanded gingival irritation has been accounted for in relationship with longer dialysis vintage,[48] despite the fact that this finding couldn't be seen in a later study.[40] Since a solid affiliation exists in the all-inclusive community among diabetes and periodontitis,[41] it has been recommended that the expanded pervasiveness of diabetes in ESRD could likewise contribute to the over-portrayal of periodontitis.[41] Mental variables and burdensome side effects may diminish the need of keeping up great oral wellbeing in ESRD populace.[41-43] At long last, hyperparathyroidism has been proposed as a potential reason for periodontal infection in ESRD patients, be that as it may, this has not been affirmed in later exploratory examinations.[44]

Poor oral hygiene causes atherosclerotic problems

The innate immune process gives prompt assurance against disease what's more, irritation by enlisting of invulnerable cells, initiation of supplement frameworks, recognizable proof and expulsion of outside substances, and actuation of the versatile invulnerable framework.[45] Nonetheless, in fiery maladies, the reactions become ceaseless, and incessant illnesses may create in view of rehashed unchecked and maladapted incendiary reactions throughout the years.[46] The most punctual changes in atherosclerosis happen in the endothelium, prompting amassing of monocytes and T cells, relocation of polymorphonuclear leukocytes into the intima, separation furthermore, expansion of the monocytes, and in the long run improvement of sinewy top.

Dental care was seen as altogether more awful in patients with intense myocardial localized necrosis than in controls and the affiliation remained substantial after modification for age, social class, smoking, serum lipid fixations, and the nearness of diabetes.[47] Poor oral cleanliness, decided by the degree of dental trash and math, was related with an expanded frequency of coronary heart sickness, and in men more youthful than 50 years at benchmark, periodontal sickness was a hazard factor for coronary coronary illness.[48] Since periodontal ailment and poor oral cleanliness are related with complete mortality, appraisals of dental wellbeing might be of an incentive as a general pointer of individual cleanliness and perhaps social insurance rehearses.[48] Patients with periodontitis shown dyslipidemia and increased non fasting serum glucose levels contrasted and controls, proposing a potential connection between periodontitis, foundational irritation, and a dysmetabolic state.[49] Therefore, in periodontitis, abundance of gram-negative microorganisms may cause endotoxemia and foundational aggravation prompting CVD.[50] Periodontal ailment may speak to a hazard factor for atherosclerosis what's more, thromboembolic occasions.[51]

Poor oral hygiene causes protein energy malnutrition

Oral ailments add to the raised frequency of protein energy wasting in CKD patients. These hazard factors are interrelated in an endless loop: though poor oral wellbeing may prompt both aggravation and PEW in CKD patients, various pathways partner the gathering of proinflammatory cytokines with various parts of PEW, including anorexia, muscle misfortune, low anabolic hormones, expanded vitality consumption, and insulin. Dryness, torment, or a for the mouth may lead to anorexia and supplement insufficiencies.[52,53] Studies has recommended that edentulous subjects are inclined to have an improper dietary consumption, (for example, ingesting too little protein and as well much calorie-rich, high-fat nourishment) as contrasted and dentated people.[53] Though the quantity of teeth is of significance for masticatory work, having premolar, molar teeth (which help to impede) is particularly significant for healthful status. The expanded periodontitis, dental caries in CKD patients lead to tooth misfortune, which may bring about biting challenges as a result of lacking occlusive surfaces or the restrictions of prostheses. No carious tooth tissue is progressively predominant in CKD people than in everyone.[54] This was recommended by certain creators as a potential result of auxiliary hyperparathyroidism driving to expanded tooth portability brought about by over the top resorption of alveolar bone.[55] Be that as it may, this finding couldn't be affirmed in a later report.[56] Extreme hyperparathyroidism has been accounted for to change the size and state of the jawbone, which fizzles to come back to typical forms considerably after parathyroidectomy.[56] A relationship between the seriousness of renal failure and the development of dental hard tissues an extra appearance of upset calcium phosphorus homeostasis was accounted for in pediatric CKD patients in the predialysis stage, experiencing dialysis, or on the other hand after kidney transplantation with key patient as controls.[57] The most plentiful measure of math and the most noteworthy salivary urea level were found in the dialyzed kids. These patients had the most noteworthy oral mucosal pH levels, in all likelihood in view of the rich flexibly of urea from the salivary organ discharge, which after hydrolysis by microbes prompts arrival of smelling salts and height of pH in the dental plaque, further advancing calcium and phosphorus precipitation.[57] In this manner, maintenance of urea may encourage dental plaque alkalization. In this manner contributing to a higher pace of

math arrangement in dialyzed patients. What's more, the most reduced salivary magnesium focus was found in dialysis patients, and in light of the fact that magnesium may repress the calcification procedure, this may additionally clarify the enhancement of dental analytics arrangement in the dialyzed patients. At last, this study demonstrated that oxalate, which is held in uremia, was a noteworthy part of dental analytics in the dialyzed patients.

Extreme periodontitis and poor dental status were related with low serum egg whites' levels and PEW in both HD and PD grown-up patients.[58,59] A last-mentioned concentrate in HD patients portrayed indications of poor oral wellbeing status in 80% of the patients who frequently had serious periodontitis related with both poor dietary status and foundational aggravation.[60]

Measures to treat patients with poor oral health in CKD patient

The higher pervasiveness of analytics in CKD patients may show lacking oral consideration. Tooth brushing, flossing, and mouthwashes may diminish gum disease, and oral cleanliness measures, mechanical debridement, as well as medical procedure can successfully forestall the inception and movement of periodontal diseases. To decrease the dangers of testing of periodontal pockets, prophylaxis with anti-toxins ought to be thought of.

Anticipation and treatment should target controlling the dental plaques and other hazard factors, capturing dynamic malady, and reestablishing lost tooth support with amendment or substitution of imperfect prostheses. Augment the impact of the periodontal treatment, patients ought to be urged to quit smoking. Guidance to diminish the seriousness of xerostomia may include: maintaining a strategic distance from mouth breathing, utilizing a humidifier; staying away from tobacco, caffeine, liquor, and mouthwashes containing Liquor, utilizing without sugar biting gum to animate salivary stream; utilizing salivation substitutes; and, if conceivable, altering dose of or changing xerostomia meds.

ESRD patients have a muddled ailment of which their dental specialists should know; for model, patients may require anti-infection prophylaxis; neighborhood sedatives with decreased epinephrine, particularly in patients with hypertension; and retaining of anticoagulants/antiplatelet operators related with the dental methodology. There have been gives an account of the spread of hepatitis C in dialysis patients by dental medical procedure, proposing oral instrumentation as a potential course of viral ailment transmission. Along these lines, cautious reconnaissance in dental consideration is significant in dialysis patients including attention to a patient's viral status before oral instrumentation.

Conclusion

Poor oral health in Chronic Kidney Disease patients relates to Protein Energy Wasting and inflammation and moderate-to-severe periodontal disease. predisposes to Chronic venous congestion -related mortality by fivefold. Maintaining a good oral hygiene is must in chronic kidney disease patients. It is the work of dentist and nephrologist to give awareness about the problems.

Source of Funding

None.

Conflict of Interest

None.

References

1. Stenvinkel P, Carrero JJ, Axelsson J, Lindholm B, Heimburger O, Massy Z: Emerging biomarkers for evaluating cardiovascular risk in the chronic kidney disease patient: How do new pieces fit into the uremic puzzle? *Clin J Am Soc Nephrol* 2008;3:505–21.
2. Kato S, Chmielewski M, Honda H, Pecoits-Filho R, Matsuo S, Yuzawa Y, Tranaeus A, Stenvinkel P, Lindholm B: Aspects of immune dysfunction in end-stage renal disease. *Clin J Am Soc Nephrol* 2008;3:1526–33.
3. Grau AJ, Buggle F, Ziegler C, Schwarz W, Meuser J, Tasman AJ, Buhler A, Benesch C, Becher H, Hacke W: Association between acute cerebrovascular ischemia and chronic and recurrent infection. *Stroke* 1997;28:1724-9.
4. Kshirsagar AV, Craig RG, Moss KL, Beck JD, OffenbacherS, Kotanko P et al, Periodontal disease adversely affects the survival of patients with end-stage renal disease. *Kidney Int* 2009;75:746–51.
5. Beck JD, Offenbacher S, Williams R, Gibbs P, Garcia R: Periodontitis: A risk factor for coronary heart disease? *Ann Periodontol* 2009;3:127–41.
6. Craig RG, Kotanko P, Kamer AR, Levin NW: Periodontal diseases: A modifiable source of systemic inflammation for the end-stage renal disease patient on haemodialysis therapy? *Nephrol Dial Transplant* 2007;22:312–5.
7. Craig RG, Spittle MA, Levin NW: Importance of periodontal disease in the kidney patient. *Blood Purif* 2002;20:113–9.
8. Souza CM, Braosi AP, Luczyszyn SM, Casagrande RW, Pecoits-Filho R, Riella MC, Ignacio SA, Trevilatto PC: Oral health in Brazilian patients with chronic renal disease. *Rev Med Chil* 2008;136:741–6.
9. Vesterinen M, Ruokonen H, Leivo T, Honkanen AM, Honkanen E, Kari K et al, Oral health and dental treatment of patients with renal disease. *Quintessence Int* 2007;38:211–9.
10. Summers SA, Tilakaratne WM, Fortune F, Ashman N: Renal disease and the mouth. *Am J Med* 2007;120:568–73.
11. Klassen JT, Krasko BM: The dental health status of dialysis patients. *J Can Dent Assoc* 2002;68:34–8.
12. Locsey L, Alberth M, Mauks G: Dental management of chronic haemodialysis patients. *Int Urol Nephrol* 1986;18:211–3.
13. Galili D, Berger E, Kaufman E: Pulp narrowing in renal end stage and transplanted patients. *J Endod* 1991;17:442.
14. Carmichael DT, Williams CA, Aller MS: Renal dysplasia with secondary hyperparathyroidism and loose teeth in a young dog. *J Vet Dent* 1995;12:143–6.
15. Potter JL, Wilson NH: A dental survey of renal dialysis patients. *Public Health* 1979;93:153–6.
16. Naugle K, Darby ML, Bauman DB, Lineberger LT, Powers R: The oral health status of individuals on renal dialysis. *Ann Periodontol* 1988;3:197–205.
17. Proctor R, Kumar N, Stein A, Moles D, Porter S: Oral and dental aspects of chronic renal failure. *J Dent Res* 2005;84:199–208.
18. King GN, Fullinfaw R, Higgins TJ, Walker RG, Francis DM, Wiesenfeld D: Gingival hyperplasia in renal allograft

recipients receiving cyclosporin-A and calcium antagonists. *J Clin Periodontol* 1993;20:286–93.
19. King GN, Healy CM, Glover MT, Kwan JT, Williams DM, Leigh IM et al, Prevalence and risk factors associated with leukoplakia, hairy leukoplakia, erythematous candidiasis, and gingival hyperplasia in renal transplant recipients. *Oral Surg Oral Med Oral Pathol* 1994;78:718–26.
20. 20.Chau NY, Reade PC, Rich AM, Hay KD: Allopurinol-amplified lichenoid reactions of the oral mucosa. *Oral Surg Oral Med Oral Pathol* 1984;58:397–400.
21. Carl W: Chronic renal disease and hyperparathyroidism: Dental manifestations and management. Compendium 1987;8:697–704.
22. Michiwaki Y, Michi K, Yamaguchi A: Marked enlargement of the jaws in secondary hyperparathyroidism: A case report. *Int J Oral Maxillofac Surg* 25: 1996;25:54–6.
23. Ganibegovic M: Dental radiographic changes in chronic renal disease. *Med Arh* 2000;54:115–8.
24. Okada H, Davies JE, Yamamoto H: Brown tumor of the maxilla in a patient with secondary hyperparathyroidism: A case study involving immunohistochemistry and electron microscopy. *J Oral Maxillofac Surg* 2000;58:233-8.
25. Levy HM: Dental considerations for the patient receiving dialysis for renal failure. *Spec Care Dent* 1988;8:34–6.
26. Sampson E, Meister F Jr.: Dental complications in the end stage of renal disease. *Gen Dent* 32: 1984;32:297–9.
27. Gavalda C, Bagan J, Scully C, Silvestre F, Milian M, Jimenez Y: Renal hemodialysis patients: Oral, salivary, dental and periodontal findings in 105 adult cases. *Oral Dis* 1999;35:299–302.
28. Epstein SR, Mandel I, Scopp IW: Salivary composition and calculus formation in patients undergoing hemodialysis. *J Periodontol* 1980;51:336–8.
29. Jaffe EC, Roberts GJ, Chantler C, Carter JE: Dental findings in chronic renal failure. *Br Dent J* 19861;160:8–20.
30. Thomason JM, Seymour RA, Rice N: The prevalence and severity of cyclosporin and nifedipine-induced gingival overgrowth. *J Clin Periodontol* 1993;20:37–40.
31. Bayraktar G, Kazancioglu R, Bozfakioglu S, Yildiz A, Ark E: Evaluation of salivary parameters and dental status in adult hemodialysis patients. *Clin Nephrol* 2004;62:380–3.
32. Kao CH, Hsieh JF, Tsai SC, Ho YJ, Chang HR: Decreased salivary function in patients with end-stage renal disease requiring hemodialysis. *Am J Kidney Dis* 2000:36;1110–4.
33. Hirshberg A, Kaplan I, Gorsky M: Beta-2-microglobulinassociated nodular amyloidosis of the tongue. *Int J Oral Maxillofac Surg* 1998;27:226–8.
34. Eigner TL, Jastak JT, Bennett WM: Achieving oral health in patients with renal failure and renal transplants. *J Am Dent Assoc* 1986;113:612–6.
35. De Rossi SS, Glick M: Dental considerations for the patient with renal disease receiving hemodialysis. *J Am Dent Assoc* 1996;127:211–9.
36. Kho HS, Lee SW, Chung SC, Kim YK: Oral manifestations and salivary flow rate, pH, and buffer capacity in patients with end-stage renal disease undergoing hemodialysis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 88: 1999;88:316–9.
37. Bots CP, Poorterman JH, Brand HS, Kalsbeek H, van Amerongen BM, Veerman EC, Nieuw Amerongen AV et al. The oral health status of dentate patients with chronic renal failure undergoing dialysis therapy. *Oral Dis* 2006;12:176–80.
38. Phelps KR, Bansal M, Twersky J: Jaw enlargement complicating secondary hyperparathyroidism in three hemodialysis patients. *Clin Nephrol* 1994;41:173–9.
39. Jaspers MT: Unusual oral lesions in a uremic patient: Review of the literature and report of a case. *Oral Surg Oral Med Oral Pathol* 1975;39:934–44.
40. Porter SR, Scully C, Hegarty AM: An update of the etiology and management of xerostomia. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2004;97:28–46.
41. Craig RG: Interactions between chronic renal disease and periodontal disease. *Oral Dis* 2008;41:1–7.
42. Antoniades DZ, Markopoulos AK, Andreadis D, BalaskasI, Patrikalou E, Grekas D: Ulcerative uremic stomatitis associated with untreated chronic renal failure: Re Report of a case and review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2006;101:608–13.
43. Hovinga J, Roodvoets AP, Gaillard J: Some findings in patients with uraemic stomatitis. *J Maxillofac Surg* 1975;3:125–7.
44. Hata T, Irei I, Tanaka K, Nagatsuka H, Hosoda M: Macrognathia secondary to dialysis-related renal osteodystrophy treated successfully by parathyroidectomy. *Int J Oral Maxillofac Surg* 2006;35:378–82.
45. Molpus WM, Pritchard RS, Walker CW, Fitzrandolph RL: The radiographic spectrum of renal osteodystrophy. *Am Fam Physician* 1991;43:151–8.
46. Kshirsagar AV, Craig RG, Beck JD, Moss K, Offenbacher S, Kotanko P, Yoshino M, Levin NW, Yip JK, Almas K, Lupovici E, Falk RJ: Severe periodontitis is associated with low serum albumin among patients on maintenance hemodialysis therapy. *Clin J Am Soc Nephrol* 2007;2:239–44.
47. Buhlin K, Barany P, Heimburger O, Stenvinkel P, Gustafsson A: Oral health and pro-inflammatory status in end-stage renal disease patients. *Oral Health Prev Dent* 2007;5:235–44.
48. Chen LP, Chiang CK, Chan CP, Hung KY, Huang CS: Does periodontitis reflect inflammation and malnutrition status in hemodialysis patients? *Am J Kidney Dis* 2006;47:815–22.
49. Al-Wahadni A, Al-Omari MA: Dental diseases in a Jordanian population on renal dialysis. *Quintessence Int* 2003;34:343–7.
50. Ellis JS, Seymour RA, Taylor JJ, Thomason JM: Prevalence of gingival overgrowth in transplant patients immunosuppressed with tacrolimus. *J Clin Periodontol* 2004;31:126–31.
51. Oliver RC, Brown LJ, Loe H: Periodontal diseases in the United States population. *J Periodontol* 1998;69:269–78.
52. Hugoson A, Norderyd O, Slotte C, Thorstensson H: Distribution of periodontal disease in a Swedish adult population 1973, 1983 and 1993. *J Clin Periodontol* 19982;25:542–8.
53. Borawski J, Wilczynska-Borawska M, Stokowska W, Mysliwiec M: The periodontal status of pre-dialysis chronic kidney disease and maintenance dialysis patients. *Nephrol Dial Transplant* 2007;22:457–64.
54. Bots CP, Brand HS, Poorterman JH, van Amerongen BM, Valentijn-Benz M, Veerman EC, ter Wee PM, Nieuw Amerongen AV: Oral and salivary changes in patients with end stage renal disease (ESRD): A two year follow-up study. *Br Dent J* 2007;202:E3.
55. Grossi SG, Zambon JJ, Ho AW, Koch G, Dunford RG, Machtei EE, Norderyd OM, Genco RJ: Assessment of risk for periodontal disease: I. Risk indicators for attachment loss. *J Periodontol* 1994;65:260–7.
56. Frankenthal S, Nakhoul F, Machtei EE, Green J, Ardekian L, Laufer D, Peled M: The effect of secondary hyperparathyroidism and hemodialysis therapy on alveolar bone and periodontium. *J Clin Periodontol* 2002;29:479–83.
57. Rahmati MA, Craig RG, Homel P, Kaysen GA, Levin NW: Serum markers of periodontal disease status and in hemodialysis patients. *Am J Kidney Dis* 2002;40:983–9.
58. Gurkan A, Kose T, Atilla G: Oral health status and oral hygiene habits of an adult Turkish population on dialysis. *Oral Health Prev Dent* 2008;6:37–43.
59. Fine DH, Markowitz K, Furgang D, Fairlie K, Ferrandiz J, Nasri C, McKiernan M, Donnelly R, Gunsolley J: Macrophage inflammatory protein-1alpha: A salivary biomarker of bone

loss in a longitudinal cohort study of children at risk for aggressive periodontal disease? *J Periodontol* 80: 2009;80:106–13.
60. Loos BG: Systemic effects of periodontitis. *Ann R Australas Coll Dent Surg* 2006;18:27–9.

How to cite: Hassan SA, Bateja S, Arora G, Prathyusha F. Poor oral health affects patients with chronic kidney disease- A review. . *IP J Urol Nephrol Hepatol Sci* 2019;3(2):29-33.