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Relationship between periodontal diseases and serum lipid levels in patients undergoing peritoneal dialysis and hemodialysis

Periton Diyalizi ve Hemodiyaliz Hastalarında Periodontal Hastalık ile Serum Lipid Seviyeleri Arasındaki İlişki

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Özet

Amaç: Sağlıklı bireylerde yapılan bazı çalışmalarda periodontal hastalık varlığı ile serum lipid değerleri arasında anlamlı bir ilişki olduğu gösterilmiştir. Ancak böbrek hastalığı olanlarda bu konu ile ilgili bir çalışma bulunmamaktadır. Biz de bu çalışmamızda periton diyalizi (PD) ve hemodiyaliz (HD) hastalarında periodontal parametreler ile serum lipid seviyeleri arasında ilişki olup olmadığını değerlendirmeyi amaçladık.

Yöntem: Çalışmaya 54 periton diyalizi ve 40 hemodiyaliz hastası dahil edildi. Tüm hastalara değerlendirmeler yapılmadan 3 ay önce ağız hijyeni eğitimi verildi. Hastalar sağlıklı, gingivitis ve periodontitis olmak üzere 3 alt gruba ayrıldı. Hastaların plak indeksi (Pİ), gingival indeks (Gİ), sondalanabilir cep derinlikleri (SCD), klinik ataşman seviyeleri (KAS) ve DMFT skorları kaydedildi.

Bulgular: Çalışmamızda HD ve PD grupları arasında DMFT skorları istatistiksel olarak farklılık göstermemektedir (p>0,05). HD ve PD hastalarında serum lipid seviyeleri ile periodontal hastalıklar arasında ilişki bulunamamıştır. (p>0,05). Serum lipidlerinin ortalama değerleri gruplar arasında ve her bir alt grupta farklılık gösterse de bu fark istatistiksel olarak anlamlı değildi (p>0,05).

Sonuç: Literatürde sağlıklı bireylerde periodontal hastalık varlığı ile serum lipid değerleri arasında anlamlı bir ilişki bulunmuş olmasına rağmen bizim çalışmamızda diyaliz hastalarında periodontal hastalık ile serum lipid seviyeleri arasında bir ilişki bulunamamıştır.

AnahtarKelimeler: Periodontal hastalıklar, serum lipid seviyeleri, periton diyalizi, hemodiyaliz.

Abstract

Objective: The aim of this study was to evaluate in association between periodontal diseases and serum total cholesterol (TC), triglyceride, low density lipoprotein (LDL) and high density lipoprotein (HDL) levels in patients undergoing peritoneal dialysis or hemodialysis treatment.

Method: 40 hemodialysis (HD) and 54 peritoneal dialysis (PD) patients were included in the study. Groups divided into three subgroups as healthy, gingivitis and periodontitis. Decayed, missing, filled teeth index (DMFT) scores and fasting venous blood samples were obtained from all of the subjects.

Results: Significant differences in age, gender and DMFT scores (p>0.05) were not observed. HDL, LDL and TC levels were significantly higher in PD group than HD group (p0.05). There were no significantly difference in the serum TC, Triglyceride, LDL, HDL and CRP levels in each subgroups of PD group (p>0.05). There were no significantly difference in the serum TC, Triglyceride, LDL, HDL and CRP levels in each subgroups of HD group (p>0.05).

Conclusion: The results indicate that there is no significant association between periodontal diseases and serum lipid levels in dialysis patients.

Keywords: Periodontal diseases, serum lipid levels, peritoneal dialysis, hemodialysis.

Introduction

Chronic renal disease (CRD) is functional loss of kidneys. Generally CRD progress in short time and number of nephrons decreases. End stage renal disease (ESRD) is the stage in which most of nephrons are lost and kidneys cannot provide needs of metabolic requirement of human body enough. At this stage, to protect patients from uremia, which threat life, patients can be subjected to dialysis therapy (1). The dialysis can provide of clear of blood by cleaning nitrogen waste and other toxic products of metabolism (2). The two dialysis modalities, hemodialysis (HD) and peritoneal dialysis (PD), exhibit similar patient's survival, but there are important differences with regard to technique and physiology. In PD, the patient's own peritoneal membrane is used for this purpose. In HD, a semipermeable membrane is used; blood filt-

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ration is carried out by a machine (dialyzer). Most patients are subjected to dialysis three days in a week, for 3-5 hours in each day (1).

ESRD patients have an increased risk of atherosclerotic complications (3). The annuals death ratio is still very high in chronic dialysis patients with cerebrovascular disease (CVD) and infections (4). Lipid metabolism disorders such as leading high total cholesterol (TC) (>200 mg/dl), high low density lipoprotein (LDL) cholesterol and low high density lipoprotein (HDL) cholesterol levels are risk factors of atherosclerosis. Also infections are responsible progression of atherosclerosis (5). Periodontal diseases are the most common infectious disease in humans. It is a common, initially bacteria-driven chronic inflammatory condition and characterized by formation of infected periodontal pockets and destruction of structures of the periodontium (6). It includes local inflammation and is associated with systemic inflammatory response (7). It was found that subjects with periodontal disease have higher serum levels of TC, LDL and triglyceride when compared to subjects with healthy periodontium (8, 9). Additionally, patients with hyperlipidemia have significantly altered periodontal indices (10). Because periodontal disease is an inflammatory process and associated with serum cholesterol levels, it can be responsible development of atherosclerosis. Indeed, previous studies showed periodontal diseases are related with complications such as chronic obstructive pulmonary disease, atherosclerosis in healthy population (11, 12).

Several strands of epidemiological evidence indicated that the prevalence of periodontal diseases are increased in ESRD patients (13). Patients under dialysis are more susceptible to infections, because of general debilitation of and depression of the immunologic response (15). Thus in these patients, treatment of periodontal diseases are very important to eliminate source of infection (16). Periodontal diseases and serum lipid levels were investigated at some studies in healthy population. But there is no study which assessed this connection at ESRD patients. So we aimed to investigate periodontal disease and serum lipid of ESRD patients.

Material and Methods

The study population included 40 HD and 54 PD patients, who were recruited from the Department of Nephrology, Faculty of Medicine, Atatürk University, Erzurum, Turkey. All the subjects included in the study were informed about the aim of the study, risks, and benefits and signed an informed consent form. Before enrollment, each patient consented to a review protocol. All procedures followed the tenets of the Declaration of Helsinki and the study protocol was approved by the Local Ethics Committee of Atatürk University.

The inclusion criteria for the volunteers to take part in the study consisted of diagnosed as ESRD patients according to clinical practice guidelines in the National Kidney Foundation, being on regular maintenance dialysis therapy (since 6 months ago) and the presence of at least 15 teeth. Patients that were taking medications including tricyclic antidepressants, anticholinergics, antihistamines, and beta-blockers, receiving radiation therapy, or using any tobacco or alcohol products were excluded from this study. Also patients with diabetes mellitus excluded from this study.

All patients take oral care education before 3 months from the periodontal assessment. At the baseline visit, a questionnaire including the following information was completed: age, sex, occupation, complete medical history, medications used and dialysis status. All the volunteers received a full-mouth periodontal examination, except for the third molars, performed at six sites per teeth (mesiobuccal, buccal, distobuccal, mesiolingual, lingual, and distolingual) by one trained examiner (G.E.D.). Assess¬ment of dental health consisted of DMFT index for the incidence of dental caries for the examination of DMFT index, the examiner recorded the teeth as decayed (D), missing (M), and filled (F) according to the WHO crite¬ria. The overall DMFT value was obtained as the sum of D, M, and F teeth for each patient The periodontal examinations included the following parameters Clinical measurements of PI, GI, PPD and CAL (17,18). All assessments were carried out by using the Williams periodontal probe. After the periodontal measurements were taken, the

patients were divided into three subgroups as periodontal healthy, gingivitis and chronic periodontitis. The diagnosis was based on the clinical criteria stated and described on the 1999 Consensus Classification of Periodontal Diseases (19) as follows:

Periodontal healthy (h): the mean of GI<1 and no sites has attachment loss.

Gingivitis (g): GI>1, no sites has attachment loss

Chronic Periodontitis (p): at least four teeth with a PPD≥ 5mm, with CAL≥2mm

Metabolic parameters

Blood samples were collected to measure TRG, TC, LDL, HDL and C-reactive protein (CRP) levels. The samples were obtained after a 12-h fasting period from an antecubital vein. Biochemical assessments were performed in the Clinical Biochemistry Laboratory of the Ataturk University Hospital.

Serum lipid levels were determined by using routine enzymatic methods. Conclusively, the current study population was made up with two main groups (PD and HD) and three sub groups (healthy, gingivitis and periodontitis).

Statistical Analyses

Data are presented as frequencies, percentages, means, and standard deviations. Statistical analyses were carried out using SPSS 15 statistical software (SPSS Inc., Chicago, IL, USA). HDL, LDL, TC, Triglyceride and CRP values obtained for PD and HD groups were compared by unpaired t-test. The comparison of HDL, LDL, TC, Triglyceride and CRP values were compared in each subgroup (healthy, gingivitis and periodontitis) by one-way Anova analysis in PD and HD groups. The level of significance was set to $p < 0.05$.

Results

40 HD and 54 PD patients participated in the current study. Significant differences in age and gender (matching variables) (p>0.05) were not observed. 6 healthy, 13 gingivitis, 21 periodontitis subgroups for HD and 9 healthy, 21 gingivitis, 24 periodontitis subgroups for PD. HDL, LDL and TC levels were significantly higher in PD group than HD group (p<0.05) (Table 1). There were no significantly difference in CRP levels between the groups (p>0.05) (Table 1).

Table 1. Serum lipid and CRP levels in peritoneal dialysis and hemodialysis groups.

	PD	HD	*p*
HDL (mg/dL)	42.44±13.44	35.67±10.10	p<0.05
LDL (mg/dL)	124.52±41.82	93.25±37.18	p<0.05
TC (mg/dL)	196.13±54.89	152.25±33.86	p<0.05
Triglyceride (mg/dL)	183.23±112.46	140.86±56.6	p<0.05
CRP (mg/L)	13.27±27.17	8.69±28.93	p>0.05

CRP: C-reactive protein, HDL: high density lipoprotein, LDL: Low density lipoprotein, TC: total cholesterol

There were no significantly difference in the serum TC, Triglyceride, LDL, HDL and CRP levels in each subgroups of PD group (p>0.05) (Table 2).

Table 2. Serum lipid and CRP levels in each subgroups of PD group.

	Healthy	Gingivitis	Periodontitis	*p*
HDL (mg/dL)	40.1±12.85	47.94±15.53	39.10±10.82	p>0.05
LDL (mg/dL)	120.5±51.26	122.11±38.05	124.85±41.85	p>0.05
TC (mg/dL)	203.9±48.26	191.24±62.54	196.38±53.4	p>0.05
Triglyceride (mg/dL)	220±194	173.5±100.3	173.4±63	p>0.05
CRP (mg/L)	5.05±5.69	15.41±34.82	11.88±17.23	p>0.05

CRP: C-reactive protein, HDL: high density lipoprotein, LDL: Low density lipoprotein, TC: total cholesterol

There were no significantly difference in the serum TC, Triglyceride, LDL, HDL and CRP levels in each subgroups of HD group (p>0.05) (Table 3).

Table 3. Serum lipid and CRP levels in each subgroups of HD group.

	Healthy	Gingivitis	Periodontitis	*p*
HDL (mg/dL)	36.8±8.25	35.71±9.91	35.16±9.82	p>0.05
LDL (mg/dL)	96.5±28.56	67.43±22.32	103.17±41.55	p>0.05
TC (mg/dL)	160.9±36.26	124.58±33.54	160.6±27.4	p>0.05
Triglyceride (mg/dL)	131±55	120.43±46.8	160.6±27.06	p>0.05
CRP (mg/L)	4.55±5.73	4.8±3.82	4.88±6.23	p>0.05

CRP: C-reactive protein, HDL: high density lipoprotein, LDL: Low density lipoprotein, TC: total cholesterol

Discussion

Periodontal disease is a destructive inflammatory disease leading to a catabolic state characterized by altered lipid metabolism and hypertriglyceridemia so can cause some changes in the plasma concentrations of cytokines. There are several studies regarding the association between periodontal diseases and serum lipids. However, these studies have subjected in systemically healthy people (8,9). The studies of Noack et al. (20) and Fentoglu et al. (10) reported an association between periodontal status and serum lipids in the hyperlipidaemic population. It has also been reported that there is a relationship between periodontal disease and both cholesterol and TRG levels (9). These findings also seemed to confirm the role of serum TRG levels in the association between periodontal disease and serum lipids (8).

Present study is believed to be the first study investigating the relationship between periodontal diseases and serum lipid levels in dialysis patients. The patients with CRF frequently have abnormality of lipoprotein metabolism, and the oxidized modification of LDL and HDL (21). It is known that HDL and LDL are decreased and intermediate-density lipoprotein (IDL) and VLDL were increased in ESRD (22). Shoji et al. reported that the cholesterol levels of HDL and LDL were lower, in ESRD patients(22). On the other hand, a 'reverse epidemiology' was proposed with altered lipid levels reflecting the vicious circle of malnutrition, inflammation and CVD observed in CKD patients (23,24). The risk of mortality is also higher at low cholesterol concentrations in subjects undergoing dialysis, as discussed in the 13th Annual Report of the UK Renal Register (25). In present study we found higher level of TC, LDL and HDL in PD group than HD group.

Studies suggest that there is a relationship between periodontal disease and serum lipid levels in healthy population (10, 20, 26, 27). Penumarthy et al. (26) indicated that, the levels of TGL, TC, and LDL cholesterol were significantly higher for periodontitis group as compared to gingivitis and periodontally healthy groups. Katz et al. (27) hypothesized that there is a strong positive statistical association between the existence of periodontal pockets and plasma lipid levels, thereby confirming a positive relationship between periodontitis and hyperlipidemia. Another study on systemically healthy subjects with gingivitis had a higher TC/HDL ratio and very LDL and Triglyceride levels when compared with periodontally healthy subjects and periodontitis patients (28,29). In fact, it may be thought that hypercholesterolemia is pathognomonic for periodontal disease, especially for gingivitis, because a cholesterol-rich diet may lead to subendothelial damage and increase the permeability of the basal membrane (30).

In conclusion, in our study we found no relationship between periodontal diseases and serum lipid levels. Serum lipid levels such as TC, LDL, HDL and triglyceride were not increased with periodontal diseases. This may because of uremia, and effect of uremia on inflammation.

As mentioned above the results of present study was not supported by the data which emphasizes periodontal disease being associated with serum cholesterol levels. Another factor to obtain this results can be the difference on methodological modalities (systemic and periodontal characteristics of study populations, biochemical tests etc.) It is necessary to evaluate in larger populations to clarify serum lipid levels on periodontal disease in dialysis patients.

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