

Original Research

Assessment of anti-citrullinated protein antibody in systemically healthy individuals with or without chronic periodontitis

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ABSTRACT:

Background: Chronic periodontitis (CP) is the inflammation of the supporting tissues of teeth, often is accompanied by progressive destruction of the periodontium, followed by severe sequelae such as pocket formation, recession, and eventually tooth exfoliation. The present study was conducted to assess anti-citrullinated protein antibody in systemically healthy individuals with or without chronic periodontitis. **Materials & Methods:** Group I comprised of 48 patients of periodontitis and group II comprised of healthy control. Clinical parameters were measured by the University of North Carolina-15 periodontal probe. The blood sample was collected from the antecubital vein, i.e., 5 ml in a sterile test tube from both the groups. Centrifugation of the blood was carried out after coagulation, and the serum was stored at -70°C until processed. ACPA level estimation was performed using commercially available ELISA kit, values were converted in relative units per milliliter (RU/ml). **Results:** Group I had 20 males and 28 females and group II had 22 males and 26 females. The mean ACPA level in group I was 127.3 and in group II was 36.2. The mean ACPA level in moderate periodontitis patients was 96.2 and in severe periodontitis patients was 178.4. The difference was significant ($P < 0.05$). **Conclusion:** There was an increase in the ACPA levels in CP patients. The severity of periodontitis was found to be related to the elevated serum levels of ACPA.

Key words: anti-citrullinated protein antibody, Chronic periodontitis, ELISA

Received: 23 March, 2022

Accepted: 28 April, 2022

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This article may be cited as: Manchanda N, Kudyar N, Gupta A. Assessment of anti-citrullinated protein antibody in systemically healthy individuals with or without chronic periodontitis. J Adv Med Dent Sci Res 2022;10(5):123-126.

INTRODUCTION

Chronic periodontitis (CP), inflammation of the supporting tissues of teeth, often is accompanied by progressive destruction of the periodontium, followed by severe sequelae such as pocket formation, recession, and eventually tooth exfoliation. Periodontal disease (PD) not only causes the loss of tooth but also has been shown to influence the systemic health of the individual and may also contribute to disorders such as diabetes, respiratory, cardiovascular, cerebrovascular diseases, osteoporosis and metabolic syndrome as well as rheumatoid arthritis (RA).¹

The association between periodontal disease (PD) and RA development has been reported and PD is an emerging risk factor for RA. PD affects more than 20% of the general population and its chronic inflammation leads to the damage of oral tissues

including periodontal ligaments, resulting in periodontal pockets and ultimately, tooth loss. Patients with RA were reported to have higher frequency of PD and severer PD than controls including patients with osteoarthritis. Since *Porphyromonas gingivalis* (*P. gingivalis*), a bacterial flora of PD, is the only microorganism ever found with citrullination enzyme peptidylarginine deiminase (PAD).²

Antibodies associated with RA have also been detected in periodontitis patients not suffering from RA.³ Inflamed periodontal tissues also show increased levels of cyclic citrullinated proteins (CCPs), along with the presence of ACPAs in gingival crevicular fluid (GCF), saliva, and serum of patients of RA[5,9] as well as CP. The diagnosis of RA routinely involves the detection of ACPA, using enzyme-linked immunosorbent assay (ELISA) based

on CCPs. Several studies have shown that it is sensitive and is a 95%–98% specific diagnostic marker of RA.^{4,5} The present study was conducted to assess anti-citrullinated protein antibody in systemically healthy individuals with or without chronic periodontitis.

MATERIALS & METHODS

The present study consisted of 48 patients diagnosed with moderate-to-severe generalized periodontitis with >30% of the sites involved with ≥3 mm of clinical attachment loss (CAL), radiographic evidence of bone loss with orthopantomogram. All were enrolled after they agreed to participate in the study.

Data such as name, age, gender etc. was recorded. Group I comprised of 48 patients of periodontitis and

group II comprised of healthy control. Clinical parameters were measured by the University of North Carolina-15 periodontal probe. The PPD and CAL from six sites on each tooth were recorded to determine the periodontal status. OPG was taken to assess the extent of bone loss. The blood sample was collected from the antecubital vein, i.e., 5 ml in a sterile test tube from both the groups. Centrifugation of the blood was carried out after coagulation, and the serum was stored at -70°C until processed. ACPA level estimation was performed using commercially available ELISA kit, values were converted in relative units per milliliter (RU/ml). Results were analyzed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Status	Periodontitis	Control
M:F	20:28	22:26

Table I shows that group I had 20 males and 28 females and group II had 22 males and 26 females.

Table II Assessment of anti-citrullinated protein antibody in both groups

Groups	Mean	P value
Group I	127.3	0.01
Group II	36.2	

Table II, Graph I shows that mean ACPA level (RU/ml) in group I was 127.3 and in group II was 36.2. The difference was significant (P< 0.05).

Graph I Assessment of anti-citrullinated protein antibody in both groups

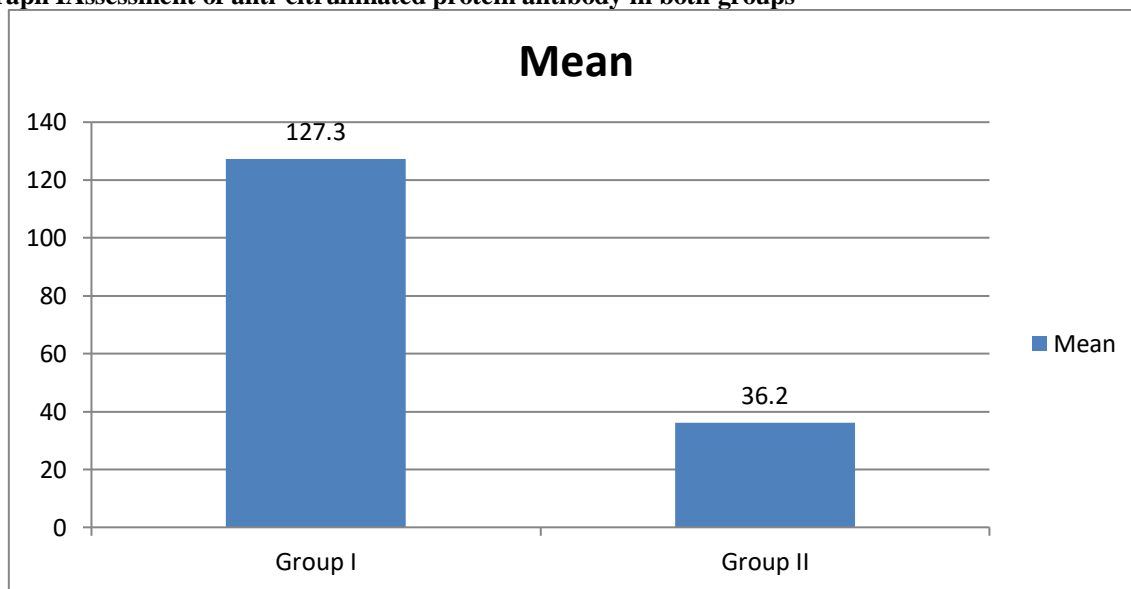
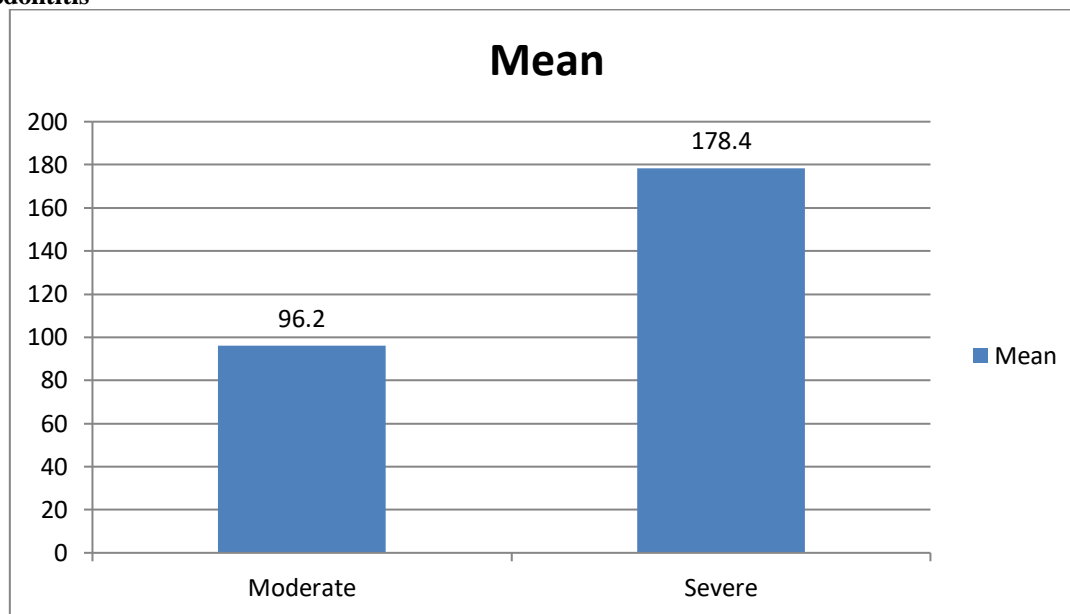


Table III Comparison of anti-citrullinated protein antibody in moderate and severe generalized chronic periodontitis

Periodontitis	Mean	P value
Moderate	96.2	0.01
Severe	178.4	

Table III, graph II shows that mean ACPA level ((RU/ml) in moderate periodontitis patients was 96.2 and in severe periodontitis patients was 178.4. The difference was significant (P< 0.05).

Graph II Comparison of anti-citrullinated protein antibody in moderate and severe generalized chronic periodontitis



DISCUSSION

Rheumatoid arthritis (RA) is the most common cause of adult chronic autoimmune arthritis in the world affecting 0.5e1.0% of the population.⁶ Environmental and genetic factors have been shown to be important for the onset of RA. Anti-citrullinated peptide antibody (ACPA) and rheumatoid factor (RF) are autoantibodies frequently found in patients with RA.⁷ ACPA is a highly specific autoantibody to RA. Smoking is an established environmental factor which is associated with RA development and ACPA positivity in RA. Although the pathological function of ACPA is not fully established, recent studies have revealed that some fractions of ACPA is pathogenic in experimental animal models.⁸ The present study was conducted to assess anti-citrullinated protein antibody in systemically healthy individuals with or without chronic periodontitis.

We found that group I had 20 males and 28 females and group II had 22 males and 26 females. Tereo et al⁹ analysed of associations between PD and ACPA production in a healthy population may deepen our understandings. A total of 9554 adult healthy subjects were enrolled. ACPA and IgM-rheumatoid factor (RF) was quantified and PD status was evaluated using the number of missing teeth (MT), the Community Periodontal Index (CPI) and Loss of Attachment (LA) for these subjects. PD status was analyzed for its association with the positivity and categorical levels of ACPA and RF conditioned for covariates which were shown to be associated with PD, ACPA or RF. As a result, all of MT, CPI and LA showed suggestive or significant associations with positivity (p = 0.024, 0.0042 and 0.037, respectively) and levels of ACPA, but none of the PD parameters were associated with those of RF. These association patterns were also observed when we analyzed 6206

non-smokers of the participants. The significant associations between PD parameters and positivity and levels of ACPA in healthy population support the fundamental involvement of PD with ACPA production.

The mean ACPA level in group I was 127.3 and in group II was 36.2. Yadav et al¹⁰ assessed the relationship between RA and chronic periodontitis (CP) by evaluating the serum levels of the anti citrullinated protein antibody (ACPA) which is a marker of RA in systemically healthy individuals with and without CP. This case-control study enrolled 40 systemically healthy individuals. Participants were divided into two groups, i.e., CP group Systemically healthy chronic periodontitis (CPSH) (n = 20) and control group Systemically healthy (SH) (n = 20), matched for age and gender. The CP patients were evaluated for periodontal parameters, namely probing pocket depth, clinical attachment loss, percentage of the site involved with attachment loss, and number of teeth present. A volume of 5 ml of venous blood was collected from both the groups and centrifuged; the separated serum was stored at - 70°C before being analyzed. Later, serum samples were tested for levels of ACPA in both the groups and compared. The mean serum ACPA levels were higher in CPSH patients compared to SH (131.38 RU/ml vs. 34.54 RU/ml, P = 0.001), which was statistically highly significant. In addition, we found a significant elevation of serum ACPA levels in severe generalized CP patients compared to moderate generalized CP patients (175.47 RU/ml vs. 95.31 RU/ml, P = 0.001), and the difference was statistically highly significant.

We found that mean ACPA level in moderate periodontitis patients was 96.2 and in severe periodontitis patients was 178.4. Various studies have

been done where ACPA is found in smokers and systemic conditions such as asthma. Smoking is an established environmental factor which is associated with RA and periodontitis development and ACPA positivity in RA. It has been suggested that this may be due to increased expression of peptidylarginine deiminase (PAD) enzymes in the lungs of smokers leading to the citrullination of native proteins in the lung, which in turn results in the formation of ACPA.^{11,12}

CONCLUSION

Authors found that there was an increase in the ACPA levels in CP patients. The severity of periodontitis was found to be related to the elevated serum levels of ACPA.

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