TABLE OF CONTENTS / 2017; 10 (2)

DENTISTRY

1. Influence of the Surface Treatment on Shear Bond Strength of Coating Ceramics of Zirconia
   Pulici Carlos E., Carvalho Geraldo AP., Kreve Simone, Franco Aline BG., Ramos Elimario V., Dias Sergio C.
   Pages 193-197

2. Human Papillomavirus Detection in Oral Potentially Malignant Disorders and Oral Squamous Cell Carcinoma
   Nyl Mas Siti Purwaningsih, Ahmad Tarmidi Sailan, Ajura Abdul Jalil, Suraya Hani Mohd Sinon
   Pages 198-201

3. Differential Induction of MAPK Signaling Pathways by Porphyromonas Gingivalis and Escherichia Coll Lipopolysaccharide in Human Monocytes
   Ichaya Vimovattana, Niraticha Chaisomboon, Jirawan Yeessbtsn and Sutatip Pongcharoen
   Pages 202-206

4. Clinical and Radiographic Evaluation of Dental Implants Penetrating the Maxillary Sinus
   Mohamed El Zahwy, Sherief Awad, Heba M. Kame, Basma Mostafa
   Pages 207-213

5. Non-surgical Periodontal Treatment and Low Level Laser Therapy (LLLT) Outcomes for Patients Suffering from Type 2 Diabetes Mellitus, Obesity and Chronic Periodontitis
   Visar Bunjaku, Mirjana Popovska, Aleksandar Groev, Shefqet Mrasori, Ariana Kameri, Zana Slamanik, Fatmir Dragidella
   Pages 214-221

   Y. Nasser Otaifah, K. Hussein, M. Benmessoud, S. El Hajjaji
   Pages 222-232

7. Quantification of Lipot eicholic Acid of Gram Positive Bacteria after Irrigation with Sodium Hypochlorite in Root Canal-An In vitro Study
   Krishnaraj Somayaji, Shobha KL, Vasudev Ballal, Nagalakshmi Narasimhasw Amy, Lokendra Gupta
   Pages 233-238

8. Effect of rSLPI Amnion Membrane Application on Incision Wound of Rattus Norvegicus in Collagen and VEGF Expression
   Elly Munadzirho, R. Helai Soekarton, Rossa Bella Vennowusky Rafii, Anita Yuliati, Nadia Kartikasari
   Pages 239-243

9. The Effect of Grape Seed Extraction Irrigation Solution towards Cleanliness the Smear Layer on Apical Third of the Root Canal Wall
   Anggraini Margono, Afriani Nov Angellina, Endang Suprastiw
   Pages 244-247

10. Depression, Anxiety and Stress among Diabetic and Non-Diabetic patients with Periodontitis
    Faisal G.G, Radeef A.S
    Pages 248-252

J Int Dent Med Res
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
<th>Pages</th>
<th>Article Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Application of Artificial Neural Network for Type 2 Diabetes Mellitus Detection Using Buccal Cell Images</td>
<td>Priyanka Kusuma Wardhani, Prihartini Widiyanti, Franky Chandra Satria Arisgraha</td>
<td>253-259</td>
<td>CLINICAL ARTICLE</td>
</tr>
<tr>
<td>12</td>
<td>Assessment of Depression, Anxiety and Stress Symptoms among Patients with Periodontal Disease</td>
<td>Radeef AS1, Faisal GG</td>
<td>260-264</td>
<td>CLINICAL ARTICLE</td>
</tr>
<tr>
<td>13</td>
<td>The Relationship between Root-Crown Ratio of First Molar's Teeth with Trauma from Occlusion</td>
<td>Wita Anggraini, Sri Lelyati C Masulili, Robert Lessang</td>
<td>265-269</td>
<td>CLINICAL ARTICLE</td>
</tr>
<tr>
<td>14</td>
<td>Maternal Knowledge, Attitude and Practices Regarding Oral Health of Preschool Children in Udupi Taluk, Karnataka, India</td>
<td>Deepak K Singhal, Shashidhar Acharya, Arun S Thakur</td>
<td>270-277</td>
<td>CLINICAL ARTICLE</td>
</tr>
<tr>
<td>15</td>
<td>Anti-Cardiolipin Antibodies in Chronic Periodontitis Patients in Kelantan, Malaysia</td>
<td>Wan Majdiah Wan Mohamad, Noor Rashidah Saad, Hasilna Taib, Siti Lailatul Akmar Zainuddin</td>
<td>278-283</td>
<td>CLINICAL ARTICLE</td>
</tr>
<tr>
<td>16</td>
<td>Correlation between Snoring, Apnea and Obstruction of Upper Respiratory Tract (Population Study in Jakarta and its vicinity)</td>
<td>Mesjje Karmiat Purwanegara, Retno Hayati Sugiarjo, Hartono Abdurachman, Bambang Sutrisna</td>
<td>284-291</td>
<td>EXPERIMENTAL ARTICLE</td>
</tr>
<tr>
<td>18</td>
<td>Third Molar Development Age Range on Indonesian Population from Various Ethnicities Based on Radiograph Findings: A Preliminary Study</td>
<td>Muhammad Luthfi, Winoto Suhartono, Annisa Dwi Puspita, Elza Ibrahim Auerkari</td>
<td>299-302</td>
<td>CLINICAL ARTICLE</td>
</tr>
<tr>
<td>19</td>
<td>Correlation between Family Economic Status and Dental Caries Risk Aged 6-12 Years</td>
<td>Inne S. Sasmita, Eriska R, Editha Meydiana S</td>
<td>303-307</td>
<td>CLINICAL ARTICLE</td>
</tr>
<tr>
<td>20</td>
<td>Relationship between Breastfeeding Status and Early Childhood Caries Prevalence in 6-24 Months old Children in Jakarta</td>
<td>Febriana Setiawati, Heriandi Sufadi, Anton Rahardjo</td>
<td>308-312</td>
<td>CLINICAL ARTICLE</td>
</tr>
</tbody>
</table>
21. Level Vitamin D, Calcium Serum and Mandibular Bone Density in HIV/AIDS Children
   Risti Saptarini P, Eriska Riyanti, Irna Sufiawati, Azhari, Inne S.Sasmita
   Pages 313-317

22. The Difference of Sex, Age, and Income on the Treatment Searching Behavior for Oral Disease
   Ristya Widi Endah Yani, Dewi Rokhmah
   Pages 318-321

23. Correlation Linear Gingival Erythema, Candida Infection and CD4+ Counts in HIV/AIDS Patients at
   UPII RSUD Dr. Soetomo Surabaya, East Java, Indonesia
   Alexander Patera Nugraha, Diah Savitri Ernawati, Adiastuti Endah P., Bagus Soebadi, Erwin Asta Triyono,
   Remita Adya Prasetyo, Sulistiowati Budi
   Pages 322-326

24. The Correlation between Age and Periodontal Diseases
   Fatimah Maria Tadjoedin, Amirah Hasna Fitri, Sandra Olivia Kuswandani, Benso Suljiaya, Yuniarti Soeroso
   Pages 327-332

25. Vascular Endothelial Growth Factor Expression after Induced by Chicken Shank Collagen Scaffold in
   Bone Regeneration
   Ariyati Retno Pratiwi, Anita Yuliati, Maretainingtias Dwi Ariani
   Pages 333-337

26. Autofluorescence and p53 Level in Saliva Examination as an Early Detection of Premalignant Lesion in
   Betel Chewer at Papua, Indonesia
   Toni Masruri, Bagus Soebadi, Iwan Hernawan, Priyo Hadi, Hening Tuti Hendarti, Diah Savitri Ernawati
   Pages 338-342

27. Correlation Between Flow Rate, Viscosity, Buffering Capacity, pH and Carries in Full and Mozaic Down
   Syndrome Children: A Study in Trisomy and Mozaic Type Down Syndrome
   Herawati Kusuma, Risti Saptarini, Inne Sasmita, Willyanti S, Sjarif Hidayat Effendi
   Pages 343-349

28. Potential Proliferation of Stem Cell from Human Exfoliated Deciduous Teeth (SHED) in Carbonate
   Apatite and Hydroxyapatite Scaffold
   Tania Sasaki, Rianita Ramadhani, Els S Budipramana, Seno Pradopo, Ketut Suardita
   Pages 350-353

29. Sweet Taste Sensitivity and Its association with Serum Zinc Levels in Women with Premenstrual
   Syndrome
   Mahda Bin Juber, Jenny Sunariani, and Yuliati
   Pages 354-357

30. Effectiveness of Chitosan Tooth Paste from White Shrimp (Litopenaeusvannamia) to Reduce Number
    of Streptococcus Mutans in the Case of Early Childhood Caries
    Harun Achmad, Yunita Feby Ramadhany
    Pages 358-363
31. Moderate Intensity Physical Exercise Effect on PMN and Macrophage Expression in Rattus Norvegicus Post Tooth Extraction  
   Wenney Setyadewi, Aqsa Sjuhada Oki, Jenny Sunariani  
   Pages 364-367

32. Clinical and Radiographic Comparison by Analyzed Cone Beam CT Between One Stage and Two Stage Dental Implants  
   Tuba Talo Yildirim, Filiz Acun Kaya, Beran Yokus, Mehmet Colak, Eylem Ozdemir, Gulcag Giray Tekin, Ebru Saribas, Ersin Uysal  
   Pages 368-373

33. Increased Overjet In Growing Child, Problem Solving In Pediatric Dentistry  
   Harun Achmad, Hasanuddin Tahir, Mardiana Adam, Yunita Febny Ramadhany  
   Pages 374-379

34. Oral Lichen Planus Erosive Type: a Case Report in Indonesian Male Patient  
   Pages 380-383

35. The Evaluation of Delayed Treatment on Dentoalveolar Trauma by Surgical Reposition and Wire-Composite Splint Technique  
   Corpusty Johan, E.M, Fajar E. Saputra  
   Pages 384-391

36. Recurrent Oral Ulceration Associated to Group Aß-Hemolytic Streptococcus Reinfection in a Post-Rheumatic Heart Disease Patient  
   Destina Radithia, Siftra Yunos Kende, Adiastuti Endah Parmadiati, Diah Savitri Ernawati  
   Pages 392-396

   Michele Callea, Andrea Avendano, Francisco Cammarata-Scalisi, Diah Ayu Maharani, Lindawati S Kusdanthi, Yasemin Yavuz  
   Pages 397-400

38. The Association between Nonspecific Low Back Pain and Spinal Radiographic Findings among Power Plant Workers  
   Ardiana Murtezani, Zana Ibraimi, Serbeze Kabashi, Kreshnik Dedushi, Egrem Gara  
   Pages 401-405
The Correlation between Age and Periodontal Diseases

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Abstract

Periodontal disease is among the most prevalent oral diseases worldwide. There is a tendency for the disease to increase in severity as people age. Epidemiology data on periodontal disease can be used to create a treatment and prevention plan for the disease. However, in Indonesia, such data is still lacking.

To discover the distribution of periodontal disease and investigate the correlation between age and periodontal disease among groups.

Ethical approval gathered from The Ethical Committee of Dental Research (KEPKG). This study design is cross-sectional, using 2,089 medical records (period 2004–2014). Age was classified into seven groups: early adolescence (12–16 years), late adolescence (17–25 years), young adult (26–35 years), late adult (36–45 years old), early elderly (46–55 years old), late elderly (56–65 years old) and senior (> 65 years).

Chronic periodontitis is predominantly distributed in adolescence (59%), adults (73%) and seniors (82%). Certain types of periodontal disease have a tendency to link certain age groups. Gingival disease is mostly seen in late adolescence (35%), chronic periodontitis occurred among those in the early elderly group (23%), whereas aggressive periodontitis among late adults (33%). Significant difference (p=0.000) and positive correlation (r=0.251) were found between periodontal disease and age (Spearman’s rho correlation test).

The most prevalent form of periodontal disease is chronic periodontitis. Even though positive-weak-correlation was found, periodontal disease has a tendency to relate with age. This study might reveal the starting age of disease initiation and the disease’s progression pattern.


Keywords: Age, distribution, medical record, periodontal disease.

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Introduction

Periodontal disease is a term that refers to infection in the periodontal tissues.1 American Academy of Periodontology (AAP), on International Workshop for a Classification of Periodontal Diseases and Condition in 1999 classified periodontal disease into gingival disease, chronic periodontitis, aggressive periodontitis, periodontitis as a manifestation of systemic disease, necrotizing periodontal disease, periodontal abscess, periodontal disease associated to endodontic lesion and developmental/acquired deformities and condition.2

Dental plaque bacteria is the main etiology of periodontal disease.1,2,3 Damage to periodontal tissue is caused by the host response to the presence of bacteria and also by the toxin produced by the bacteria itself.1,3 Besides the main etiology, there are several factors that may increase the risk of periodontal disease, referred to as risk factors, which may enhance the host response to the bacterial infection in periodontal tissue. These risk factors can be categorized as local and systemic factors.1

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Age is among systemic factors that influence the occurrence of periodontal disease. According to the Ministry of Health Republic of Indonesia as described by Akbar and Pratiwi (2016), age can be classified into seven groups, namely early adolescence (12-16 years), late adolescence (17-25 years), young adult (26-35 years), late adult (36-45 years old), early elderly (46-55 years old), late elderly (56-65 years old), and senior (> 65 years). The prevalence and severity of periodontal disease tends to increase with patient age. Degenerative changes in periodontal tissues are assumed to be the cause of this condition. In addition, prolonged exposure to the accumulation of risk factors during one’s life is also assumed to be associated with this condition. It stated that elderly patients who followed preventive activities had minimal attachment loss. In contrast, other in-vivo studies reported that aged mice had produced a greater adaptive immune response compared to young mice. It can be concluded that the process of aging or degenerative change had not caused an increase in the prevalence and severity of periodontal disease.

Some studies suggest that there are differences in the prevalence of periodontal disease in each age group. Gingivitis is the most common periodontal disease among children and adolescence in China, with an increase in severity with age. In contrast, a report by Idriss et al. (2014) confirmed no relationship between age and gingivitis. Among adults in the United States, periodontitis is the most frequently occurring periodontal disease (47%), with 30% of such cases deemed moderate. Among the elder population in US, periodontitis is also the most common periodontal disease.

An epidemiological study can be carried out to show the distribution of periodontal disease in each age group. The distribution is displayed in a polygon, table or histogram. By displaying the distribution of periodontal disease, the pattern of periodontal disease in a population can be seen and interpreted easily. The general concept of an epidemiology study is to gain information to promote, protect and restore health based on evidence. However, since epidemiology data on periodontal disease related to age in Indonesia lacks clarity, this study aims to serve as a source of consideration in creating a treatment and prevention plan to tackle the disease.

### Materials and methods

This study received ethical approval from The Ethical Committee of Dental Research (KEPKG) 2016 and was conducted at the Department of Periodontology, Dental Teaching Hospital, Faculty of Dentistry, Universitas Indonesia (RSKGM FKG UI), through a cross-sectional method using descriptive statistics and analytical statistics. This study used 2,069 medical records documented from 2004-2014 as a sample, with total sampling as the sampling method. The variable dependent of this study is periodontal disease. Patient age serves as the independent variable.

Age is categorized based on classification of age as early adolescence (12-16 years), late adolescence (17-25 years), young adult (26-35 years), late adult (36-45 years old), early elderly (46-55 years old), late elderly (56-65 years old), and senior (> 65 years). Periodontal disease is categorized based on the classification of periodontal disease by the American Academy of Periodontology to include gingival disease, chronic periodontitis, aggressive periodontitis, periodontitis as a manifestation of systemic disease, periodontal abscess and other periodontal diseases including necrotizing periodontal diseases, periodontal disease associated with endodontic lesion, and developmental/acquired deformities and condition.

This study began with the collection of medical records from 2004-2014, which were later selected from based on the criteria that the medical records must consist of information on patient age and periodontal diagnosis. The 2,069 selected medical records were then recorded and processed by Microsoft Excel. For bivariate analysis, the variables of periodontal disease were ranked in two categories namely gingival disease and periodontitis, including chronic periodontitis, aggressive periodontitis and periodontitis as a manifestation of systemic disease. From the 2,069 medical records, 1,974 medical records were selected to be analyzed by SPSS 16.0 with Spearman’s rho correlation test.

### Results

Approximately 2,131 medical records were obtained during the data collection process, 62 medical records of which were excluded
owing to incomplete data. The selection process concluded with 2,069 medical records selected to be used in this study, with the following distribution: 57.6% female patients and 42.4% male patients. Chronic periodontitis is the most common periodontal disease each year. The number of cases of each periodontal disease in the 2004-2014 period include (Figure.1), 71 (3.4%) cases of localized gingivitis, 87 (4.2%) cases of generalized gingivitis, 594 (29%) cases of localized chronic periodontitis, 955 (46.2%) cases of generalized chronic periodontitis, 31 (1.4%) cases of localized aggressive periodontitis, 152 (7%) cases of generalized aggressive periodontitis, 84 (4%) cases of periodontitis as a manifestation of systemic disease, 16 (0.8%) cases of periodontal abscess not accompanied by other periodontal diseases and 79 (4%) cases of other periodontal disease, including gingival hyperpigmentation, gingival hyperplasia, NUP / NUG.

Distribution of patient age group based on classification by the Ministry of Health Republic of Indonesia (Depkes RI, 2009) in 2004-2014 shows 31 (1.5%) patients in the early adolescence group, 274 (13.2%) patients in the late adolescence group, 448 (21.7%) patients in young adult group, 466 (22.5%) patients in the late adult group, 449 (21.7%) patients in the early elderly group, 307 (14.8%) patients in the late elderly group, and 94 (4.5%) patients in the senior group.

As seen in figure.2, the young adult, late adult and early elderly groups accounted for the most patients among other age groups each year. Types of periodontal disease have a tendency to occur more in certain age groups. Gingival disease can be found the most in the late adolescent group (35%).

Figure 2. Distribution of Patient Age Group Period 2004-2014 (%).

Figure 3. Distribution of Gingivitis.

Figure 4. Distribution of Chronic Periodontitis.

Figure 5. Distribution of Aggressive Periodontitis.
Chronic periodontitis disease occurs most frequently in the early elderly group (23%), while aggressive periodontitis disease is most prevalent in the late adult age group (33%). Periodontitis as a manifestation of systemic disease occurs the most in the late elderly group (32%).

A tendency for the occurrence of periodontal abscesses and other periodontal diseases are not found in certain age groups. More detailed information is shown in the figures below. (Figure 3 – Figure 8)

Table 1. Correlation between Periodontal Disease and Age Group.

| Periodontal Disease | Coefficient correlation (r) | P Value | "r" in Table 1 shows direction and strength of correlation.
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<tr>
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</tr>
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<td></td>
<td>0.25</td>
<td>1.000</td>
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<tr>
<td>P Value</td>
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Value p<0.05 = presence of correlation. *(Significant)*

Table 1 shows the value of Spearman’s rho correlation between periodontal disease by age group is 0.000 (p<0.05), meaning there is a correlation between periodontal disease and age group. The coefficient correlation (r) of periodontal disease and age groups is 0.251, indicating there is a weak correlation with positive direction between these variables.

Discussion

From the 2,069 medical records used in this study, there was a significant difference in quantity of medical records available for the years 2004 and 2005. The significantly low quantity of medical records in those years may be correlated to the lack of organization of medical records then. Members of the early adult (21.6%), late adult (22.5%) and early elder (21.7%) age groups suffered the most from periodontal disease each year. This condition is consistent with a report by Eke et al. (2012) that said 47.2% of the adult population in the US suffered from periodontal disease. It is also known that chronic periodontitis was the most prevalent periodontal disease in period of 2004-2014. Data for gingival disease could not be collected entirely in this study, as medical records of those diagnosed with mild gingivitis were stored in integrated clinics instead of periodontal clinics. However, this study is still able to show the distribution of periodontal disease in the urban population because the data was taken from a dental referral center hospital under a well-known dental education institution in Jakarta, Indonesia.

The results show that gingivitis was mostly experienced by the late adolescent age group (17-25) (35%), while chronic periodontitis mostly occurred in the early elderly age group (46-55) (23%). These results are in line with a study by Eke et al. that confirmed a high prevalence of periodontitis in US adults aged 30
years and older. Nanaiah et al. (2013) reported that only 1.5% of 1100 subjects (15-18 years old) suffered chronic periodontitis, moreover the author stated that the presence of gingivitis started to increase in adolescence (16 years old). This distribution of chronic gingivitis and periodontitis shows there is a tendency for periodontal diseases to increase in severity in the older age group, matching the results of previous studies. The increased severity of periodontal disease is not caused by a damage rate increase in periodontal tissues, but rather caused by an accumulation of the damage in periodontal tissues.

Aggressive periodontitis is mostly suffered by the late adult group (36-45) (33%). A study conducted by Cecilia et al. explained that although aggressive periodontitis was commonly found in young age, it still had the probability to be found in all age groups. Another report by Fatema and Desai (2016) stated that the prevalence of aggressive periodontitis was 7% among 200 patients.

Our results showed that chronic periodontitis occurred frequently in all age groups, with an increasing percentage in the older age groups, such as, 56% in the adolescence group, 74% in the adult group, and 88% in the elderly group. Bokhari et al. (2015) also reported that subjects aged 40 years and above were four times more likely to have periodontitis using Community Periodontal Index (CPI) methods. This data shows that not only is the severity increasing but the prevalence of periodontal disease also increases with age. Moreover, with aging, oral epithelial cells have reduced mitotic activity and metabolic rate. It is assumed that this condition will lead to an impaired immune system and make a patient more susceptible to bacterial infection. General deterioration in immune functions and tissue integrity in older age may serve as a hypothesis for the weakness of periodontal disease.

The result of Spearman's rho correlation test between periodontal disease and age groups is ρ < 0.05, which means there is a correlation between periodontal disease and age groups. The correlation coefficient (r) of periodontal disease and age groups is 0.251, meaning that the severity of periodontal disease increases with age, but the correlation is weak. This result matches previous studies stating periodontal disease increases in severity in older age groups. According to a study by Jiang et al. (2016), from 987 Chinese women, women ≥ 30 years old have a significantly greater chance to experience moderate to severe periodontitis compared to women below 30 years old (OR: 0.88). In our finding, the weak correlation might be due the presence of other risk factors that contribute to the incidence of periodontal disease.

Conclusions

The most prevalent form of periodontal disease is chronic periodontitis. Even though a positive-weak-correlation was found, periodontal disease tends to relate to age. This study might reveal the starting-age of disease initiation and disease progression pattern.

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Declaration of Interest

The authors report no conflict of interest.

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