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Age and gender related changes in Salivary Immunoglobulin A in healthy subjects

Dental Science

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ABSTRACT

Aim: The aim of this study was to investigate the age- and gender-dependent changes of salivary IgA levels among healthy subjects.

Materials and Methods: A total of 150 healthy individuals (aged 1-70 years) were enrolled in the study. Two milliliters of saliva were collected from all participants, and salivary IgA levels were measured by the ELISA technique.

Results: Mean salivary IgA levels were significantly higher in subjects aged 11-20 years as compared to subjects aged 1-10 years ($P < 0.01$). Mean salivary IgA levels increased with age up to the age of 60 years, and then slightly decreased in subjects aged 61-70 years. No significant differences were observed between men and women regarding salivary immunoglobulin levels.

Conclusion: These results showed age-dependent changes of the salivary IgA levels. Gender had no effect on the salivary levels of IgA.

Introduction

Saliva is commonly referred to as bloodstream of the oral cavity and has a major role in maintaining teeth enamel mineralization.(1) Saliva plays an important role in defense against pathogenic microorganisms due to the presence of defense proteins that react in specific (immunoglobulins) or non-specific (lysozyme, peroxidase, cystatins, lactoferrin, histatins) ways inhibiting the growth of micro-organisms.(1)

Immunoglobulins are glycoprotein molecules that are produced by plasma cells in response to an immunogen and function as antibodies. Out of all immunoglobulins Salivary immonuglobulin A (IgA) is considered the first line of defense against microbial antigens. The salivary IgA antibodies help maintain the integrity of the oral surfaces by preventing microbial adherence to epithelial and tooth surfaces by neutralizing enzymes, toxins, and viruses or by acting in synergy with other antibacterial factors. Salivary IgA also prevents the penetration of food antigens in the oral mucosa. Lower concentration of IgA in saliva is associated with increased risk for periodontal disease and caries.(2,3)

Factors such as age and physical exercise modulate the mucosal immune system; including saliva IgA responses. Decreased levels of saliva IgA in elite athletes as well as high age have been correlated to increased susceptibility for upper respiratory tract infections; thus, there is value in further investigating the relationship with advancing age and IgA modulation.

Materials and Methods

Subjects

A total of 150 healthy subjects (80 men and 70 women, aged 1-70 years) visiting the outpatient department of dental college from J.L.N. Medical college, Ajmer were enrolled in the study.

All participants were basically healthy, with no acute or chronic illnesses. Subjects with a history of recurrent infections, asthma, allergy and atopic diseases, or any suspected immunological disorders were excluded from the study, as were those reporting a cigarette smoking habit or use of any drugs. Children were recruited from randomly selected kindergartens and schools in the city.

An informed consent was obtained from the participants before enrollment in the study. This study was also approved by the Ethical Committee of the Institution.

Saliva sampling was performed randomly according to the registration number of the participants. The subjects were divided into 7 groups according to their ages (Table 1)

Collection of the saliva

All saliva samples were collected at morning between 10 a.m. and 11 a.m. Before collecting the saliva, the subjects had not eaten or drunk for at least 1 h. Approximately 1 hour before collection of the saliva samples, the participants brushed their teeth and washed their oral cavity with sterilized water. Unstimulated whole saliva samples were collected from the mouth on a single occasion, during a period of 5 min. The saliva was collected directly into sterilized tubes, which were then placed on ice. All samples were centrifuged for 15 min at 10,000 g and 4°C to remove cells and debris. The supernatants were kept at –70°C until used.

Immunoglobulin A quantification in saliva

Detection of IgA in saliva was performed by sandwich ELISA. Salivary IgA levels were quantitated by using appropriate dilution of a standard IgA sample with a known concentration of IgA, provided by the manufacturer (Beta, Mashhad, Iran) and expressed as mg/dL.

Results

Statistical analysis using the ANOVA test showed that there were significant differences among the mean salivary IgA levels of the different age groups ($P < 0.001$). The mean salivary IgA levels were significantly higher in subjects aged 11-20 years as compared to subjects aged 1-10 years ($P < 0.01$). The mean salivary IgA levels increased with age up to the age of 60 years and then slightly decreased in subjects aged 61-70 years.

Overall, the mean salivary IgA concentrations in women were higher than in men, but the difference was not significant.

The observed age-dependent changes of salivary IgA are presented in Table 1.

Discussion

Age-related immune decline and dysregulation, immunosenescence,

is associated with increased susceptibility to bacterial and viral infections (4). Infectious diseases in the elderly are more common and severe than in younger adults (5), with pneumonia being the second commonest cause of death in over 75s and community acquired accounting for a fifth of all deaths (6,7). *Streptococcus pneumoniae* causes up to half of community acquired pneumonia and is a commensal bacteria of the upper respiratory tract but can spread to other areas and result in invasive disease (8). Most cases of bacterial meningitis can be attributed to S pneumoniae, which is associated with earlier and higher mortality rates in older adults (9,10). Elderly individuals are also at risk of bacterial infection due to *Neisseria meningitides;* generally manifesting as pneumonia rather than meningitis (11). Further, adults aged over 65 years who contract a disease caused by *Haemphilus influenzae* bacteria are at higher risk of mortality than young adults (12). Therefore, vulnerability to, and severity of, bacterial infections in older adults is evident across a range of bacteria.

Immunosenescence in the upper respiratory tract has been suggested to underlie the increased susceptibility of older adults to pneumococcal disease (8). Salivary antibodies play an important role as the first line of defence against pathogens and assist in controlling carriage of bacteria, such as *S pneumoniae* and *H influenzae,* and consequently respiratory and invasive disease (13). Accordingly, changes in salivary antibodies with ageing may contribute to mucosal immunosenescence and infection risk in older adults.

Immunoglobulin A (IgA), in its secretory form, is the main class of antibodies in saliva and IgA concentration and secretion rate has been used as a marker of mucosal immunity and to assess risk of upper respiratory tract infection (14). The results indicate that Salivary IgA secretion rates are significantly lower in elderly individuals and decrease with increasing age which is in accordance with previous studies (15,16).

Legends for table

Table 1 shows the age related changes of salivary IgA in healthy subjects

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Age group	Number of subjects	IgA (mg/dl) Mean±SD	p Value (versus group I)
I(1-10)	07	3.26± 2.85	--
II(11-20)	26	7.24± 8.42	0.01
III(21-30)	35	9.35± 5.60	0.002
IV(31-40)	32	9.67±3.45	0.001
V(41-50)	30	11.24±2.87	0.001
VI(51-60)	11	10.57±0.03	0.005
VII(61-70)	09	9.89±1.54	0.004

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