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Opinion

Exploration of the Possible Association between ABO Blood System and Periodontal Disease

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Periodontal disease (PD) characterized by a multifactorial etiology and affect a large population worldwide. Dental plaque accumulation is the main etiologic factor, however genetic factors seem to play an important role in PD pathogenesis [1]. Consequently, it would be interesting to focus on the influence of genetic factors in PD patients and to investigate the possible association between those and PD. One of those factors is the ABO blood group system and it would be important to investigate if the antigens of the ABO blood group have somehow increased the susceptibility to the PD.

PD has a multifactorial etiology and the pathogenesis of the disease has not been completely determined yet, whereas an amount of studies have suggested that genes play one of the crucial roles in PD development [2].

The ABO blood groups system was discovered decades ago [3] and its antigens consist bio-chemical indices that are expressed in several cell types including erythrocytes, gastrointestinal cells, lung epithelial cells, mucosa cells, plasma and other body fluids [4].

An association has been recorded between the presence or absence of the mentioned ABO blood group system and several diseases and disorders, whereas those antigens also can be acted as receptors for infectious agents. Immuno-histochemical reports have demonstrated the presence of A and B antigens on spinous cells in the non-keratinized oral epithelium of blood group A and B, where basal cells express precursor structures and the more-differentiated spinous cells express the A or B antigens. Individuals with blood group O who do not have the A and B gene-coded glycosyl-transferase express a fucosylated variant (Ley) of the precursor structure [5].

The antigens of ABO blood system are located on carbohydrate oligosaccharide chains, which are parts of glycosphingolipids or gp molecules. Those ABO genes directly encode for the enzymes that add specific glucose molecules to the erythrocytes membrane and those molecules consist the ABO blood system antigens [6].

In addition, it has been recorded that carbohydrates can act as receptors for *Porphyromonas gingivalis*, that plays a critical role in PD pathogenesis [7].

An increasing number of researchers have recorded that the ABO blood group plays an important role in several disorders and pathological condition as has already mentioned and the possible link between ABO blood group and susceptibility to chronic disease as an example of genetic basis for family predisposition has also been investigated [8].

To be more specific an association between inherited human ABO blood group antigens with diseases such as coronary heart disease [9], ischemic stroke [10,11] and several types of malignancies [12,13] including pancreatic cancer [14-16], renal cell carcinoma [17], ovarian cancer [18], colorectal cancer [19-21], gastric cancer [22-24], hematological malignancies [25] and lung cancer [26-31] was recorded. However, the data on the role of ABO blood group factor in lung cancer is limited and inconsistent [3].

Despite the fact that a great amount of reports have been carried out to examine the possible relationship between ABO blood group system and the incidence of several diseases and disorders, a limited amount of studies have investigated the relationship and the incidence regarding oral and dental diseases such as PD and the possible association with ABO blood group system.

Significant relationships have been observed between ABO blood group system and several oral diseases such as dental caries [32], salivary gland tumors [33] and oral cancer [34].

Regarding the examined relationship between ABO blood group system and PD, in some reports a significant association has been observed [32,35-43]. On the contrary, no significant associations have been recorded in few studies [39,44,45], whereas other researches [5,32] recorded that different ABO blood groups may show significant differences in the rates of colonization of a number of periodontal pathogens that are the main etiologic factors of PD.

The mentioned controversial findings could be attributed to the geographic diversity in the population groups.

It is complicated and difficult to elaborate a possible hypothesis on why individuals with particular ABO blood group have been found in increased frequency in periodontitis groups, or in various grades of periodontal involvement. However, the development of PD, gingivitis and periodontitis is a result of many known and unknown factors and the possible genetic influence maybe is responsible for a small rate of the multifactorial etiology of PD.

In conclusion, despite any contradictory views, the ABO blood system may play a role as a potential risk factor for PD development. It is obvious that exists an urgent need for further investigation.

Conflict of Interest

None.

Bibliography

1. Genco RJ. "Current view of risk factors for periodontal diseases". *Journal of Periodontology* 67.10 (1996): 1041-1049.
2. Hart TC., *et al*. "Genetic factors in the pathogenesis of periodontitis". *Periodontol*ogy 14 (1997): 202-215.
3. Landsteiner K. "Zur Kenntnis der antifermentativen, lytischen und agglutinierenden Wirk-ungen des Blutserumsund der Lymphe". *Zentralblatt Bakteriologie* (1900): 357-362.
4. Graziano SL., *et al*. "Blood group antigen A and flow cytometric analysis in resected early stage non-small cell lung cancer". *Clinical Cancer Research* 3.1 (1997): 87-93.
5. Campi C., *et al*. "Secretor status and ABH antigens expression in patients with oral lesions". *Medicina* Oral *Patologia* Oral *y Cirugia Bucal* 12.6 (2007)*:* E431-E434.
6. Webert KE., *et al.* "Red Cell Platelet and White Cell Antigens". In: Kasper, Dennis L, and Tinsley Randolph Harrison. Harrison's principles of internal medicine. New York: McGraw-Hill, Medical Pub. Division (2005).
7. Hellström U., *et al.* "Carbohydrates act as receptors for the periodontitis-associated bacterium Porphyromonas gingivalis: a study of bacterial binding to glycolipids". *Glycobiology* 14.6 (2004): 511-519.
8. Roberts JA. "Blood groups and susceptibility to disease: A review". *British Journal of Preventive and Social Medicine* 11.3 (1957): 107-125.
9. He M., *et al*. "ABO blood group and risk of coronary heart disease in two prospective cohort studies". *Arteriosclerosis, Thrombosis, and Vascular Biology* 32.9 (2012): 2314-2320.
10. Williams FM., *et al*. "Ischemic stroke is associated with the ABO locus: the Euro CLOT study". *Annals of Neurology* 73.1 (2013): 16-31.
11. Whincup PH., *et al*. "ABO blood group and ischemic heart disease in British men". *British Medical Journal* 300.6741 (1990): 1679-1682.
12. Vasan SK., *et al*. "ABO blood group and risk of cancer: A register-based cohort study of 1.6 million blood donors". *Cancer Epidemiology* 44 (2016): 40-43.
13. Iodice S., *et al*. "ABO blood group and cancer". *European Journal of Cancer* 46.18 (2010): 3345-3350.
14. Risch HA., *et al*. "ABO blood group and risk of pancreatic cancer: a study in Shanghai and meta-analysis". *American Journal of Epidemiology* 177.12 (2013): 1326-1337.

15. Greer JB., *et al*. "Significant association between abo blood group and pancreatic cancer". *World Journal of Gastroenterology* 16.44 (2010): 5588-5591.

16. Ben Q., *et al*. "Pancreatic cancer incidence and outcome in relation to ABO blood groups among Han Chinese patients: A case-control study". *International Journal of Cancer* 128.5 (2011): 1179-1186.

17. Joh HK., *et al*. "ABO blood group and risk of renal cell cancer". *Cancer Epidemiology* 36.6 (2012): 528-532.

18. Poole EM., *et al*. "ABO blood group and risk of epithelial ovarian cancer within the ovarian cancer association consortium". *Cancer Causes Control* 23.11 (2012): 1805-1810.

19. Urun Y., *et al*. "ABO and Rh blood groups and risk of colorectal adenocarcinoma". *Asian Pacific Journal of Cancer Prevention* 13.12 (2012): 6097-6100.

20. Halvorsen TB. "ABO blood groups, rhesus types, and colorectal adenocarcinoma. A retro-spective study of 747 cases". *Scandinavian Journal of Gastroenterology* 21.8 (1986): 979-983.

21. Slater G., *et al*. "Clinicopathologic correlations of ABO and Rhesus blood type in colorectal Cancer". *Diseases of the Colon and Rectum* 36.1 (1993): 5-7.

22. Wang Z., *et al*. "ABO blood group system and gastric cancer: a case control study and meta-analysis". *International Journal of Molecular Sciences* 13.10 (2012): 13308-13321.

23. Aird I., *et al*. "A relationship between cancer of stomach and the abo blood groups". *British Journal of Medicine* 1.4814 (1953): 799-801.

24. Edgren G., *et al*. "Risk of gastric cancer and peptic ulcers in relation to ABO blood type: a cohort study". *American Journal of Epidemiology* 172.11 (2010): 1280-1285.

25. Janardhana V., *et al*. "ABO blood groups in hematological malignancies". *Cancer Genetics and Cytogenetics* 51.1 (1991): 113-120.

26. Alvarez-Fernandez E., *et al*. "Expression of blood group antigens by normal broncho-pulmonary tissues and common forms of pulmonary carcinomas". *Archives of Pathology and Laboratory Medicine* 115.1 (1991): 42-49.

27. Gwin JL., *et al*. "Loss of blood group antigen A in non-small cell lung cancer". *Annals of Surgical Oncology* 1.5 (1994): 423-427.

28. Rice TW., *et al*. "Expression of blood group antigen A by stage I non- small cell lung Carcinomas". *The Annals of Thoracic Surgery* 59.3 (1995): 568-572.

29. Sanchez-Mora N., *et al*. "Expression of histo-blood group antigens in bronchial squamous metaplasia". *European Respiratory Journal* 29.2 (2007): 268-272.

30. Suadicani P., *et al*. "ABO phenotypes and inflammation-related predictors of lung cancer mortality: the Copenhagen Male Study-a 16-year follow-up". *European Respiratory Journal* 30.1 (2007): 13-20.

31. Leon-Atance P., *et al*. "Prognostic influence of loss of blood group A antigen expression in pathologic stage I non-small-cell lung cancer." *Archivos de Bronconeumologia* 48.2 (2012): 49-54.

32. Demir T., *et al*. "The effect of ABO blood types on Periodontal status". *European Journal of Dentistry* 1.3 (2007): 139-143.

33. Pinkston JA., *et al*. "ABO blood groups and salivary gland tumors (Alabama United States)". *Cancer Causes Control* 7.6 (1996): 572-574.

34. Vijay Raghavan MR., *et al*. "Incidence of ABO blood groups in oral cancer in South Kanara District". *Journal of the Indian Dental Association* (1986): 305-308.

35. Koregol AC., *et al*. "ABO blood groups and Rhesus factor: An exploring link to periodontal diseases". *Indian Journal of Dental Research* 21.3 (2010): 364-368.

36. Kaslick RS., *et al*. "Investigation of periodontosis with periodontitis: Literature survey and findings based on ABO blood groups". *Journal of Periodontology* 42.7 (1971): 420-427.

37. Arowojolu MO., *et al*. "The relationship between juvenile and non-juvenile periodontitis, ABO blood groups and haemoglobin types". *African Journal of Medicine and Medical Sciences* 31.3 (2002): 249-252.

38. Gawrzewska B. "ABO, Rh and MN Blood and ABH group factors in saliva related to periodontal diseases". *Czasopismo* Stomatologiczne 28.10 (1975): 1007-1014.

39. Pradhan AC., *et al* . "The relationship between periodontal disease and blood groups and secretor status". *Journal of Periodontal Research* 6.4 (1971): 294-300.

40. Mansour Al-Askar. "Is there an association between ABO blood grouping and periodontal disease? A literature review". *Interventional Medicine and Applied Science* 9.3 (2017): 164-167.

41. Vivek S., *et al* . "Association of ABO Blood Group and Rh factor with Periodontal Disease in a Population of Virajpet, Karnataka: A Cross-Sectional Study". *Journal of International Oral Health* 5.4 (2013): 30-34.

42. Ali ST., *et al*. "Association between ABO Blood Groups and Severity of Chronic Periodontitis". *Journal of King Abdulaziz University-Medical Science* 16.3 (2009): 31-41.

43. Pai GP., *et al*. "Correlation between "ABO" blood group phenotypes and periodontal disease: Prevalence in South Kanara district, Karnataka state, India". *Journal of Indian Society of Periodontology* 16.4 (2012): 519-523.

44. Barros L., *et al*. "Oral and genetic study of Chileans 1960 III. Periodontal disease and nutritional factors". *Archives of Oral Biology* 8 (1963): 195-206.

45. Frias MT., *et al*. "No association between secretor status of ABO blood group antigens and juvenile periodontitis". *Acta Odontologica Latinoamericana* 8.2 (1994): 9-15.

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