

Relationship between ABO Blood Group and ABH Secretor Status in Kano, North-western Nigeria.

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ABSTRACT

BACKGROUND: The determination of ABO Blood groups and ABH secretor status in blood and body fluid antigens respectively may have certain structural and disease related genetic linkages, hence the need to establish relationship between blood group and secretor status in the population.

METHOD: A total of 256 subjects comprised of blood donors and healthy pregnant women at Aminu Kano Teaching Hospital, Kano were studied. Their ABO Blood groups and secretor status were determined by standard tile/tube and haemagglutination inhibition methods respectively.

RESULTS: The result of this study shows that blood group B had the highest percentage of secretors (85.33%) followed by blood group AB (83.33%). Blood group O had a value of 64.18% while blood group A had the lowest prevalence of secretors of 61.9% in Kano metropolis.

CONCLUSION: Blood groups A and O have lower prevalence of secretors compared to blood group B and AB, in Kano metropolis. There is need for further study to identify risk predisposition of these groups to cancer of the stomach and duodenal ulcer disease respectively; as reported in other parts of the world.

KEY WORDS: Relationship, ABO, secretor status, Kano, Nigeria

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INTRODUCTION

Determining ABH secretor status can be useful in clinical practice as differences in ABH secretor status drastically alters the carbohydrate present in body fluids and secretions; this can have profound influence on microbial attachment and persistence. Secretor genes, *Se* (FUT2 at19q 13.3) code for the activity of glycosyltransferase enzymes needed to assemble aspects of both the ABO and Lewis blood groups.¹ The Lewis (*Le*) antigens, *Le^a* and *Le^b* are not intrinsic to the red cells but are expressed on glycosphingolipids absorbed from plasma onto red cells. ABH secretors secrete A and/or B substance in their plasma and body fluids and non secretors do not secrete neither H, A, nor B regardless of their ABO genotype. ABH secretor status is determined by a pair of alleles, *Se* and *se* at the secretor locus (FUT2) and the *Se* gene responsible for H

secretion is dominant over *se*.² Studies have shown relationship between secretor status and blood group antigens, for example among Lewis positive individuals [*Le* (a+b-), *L* (a-b+), *Le*(a+b+)], *L^b* antigen individuals are always secretors and reflect the presence of both *Le* and *Se* genes and red cells express *Le^b* but not *Le^a* while *Le^a* red cells express *Le* but not *Se* genes and such individuals are always non secretors.³ Thus, secretor status is always used to determine the Lewis outcome but, among Lewis negative [*Le*(a-b-)] individuals (having neither *Le^a* nor *Le^b* antigen) who constitute about 1- 8% of the population, the ABH secretor status cannot be used to determine Lewis outcome²⁻⁴.

In ABO blood group antigens, the detection of small amounts of A or B antigen in the saliva of a secretor can be a useful confirmatory test when establishing a phenotype that involves a subgroup of A or B.^{2,4} Blood group and secretor status have been known to predispose or confer immunity to individuals from certain diseases; for example, blood group O individuals that are non secretors have an increased risk of developing peptic ulcer disease to about 2.5 fold compared to the general population.⁵ It has also been reported that blood group B individuals are susceptible to oesophageal and biliary cancers⁶ while some other report found non secretors to be predisposed to Rheumatic fever and rheumatic heart disease⁷.

The aim of this study was to determine the ABH secretor status and ABO blood group pattern in Kano, North-Western Nigeria.

MATERIALS AND METHOD

A total of 256 consecutive blood donors and healthy pregnant women on routine antenatal clinic visit were recruited for the study at Aminu Kano Teaching Hospital, Kano between January and October, 2005. Ethical approval was obtained from the Ethics and Review Board of Aminu Kano Teaching Hospital and informed consent obtained from each participant in the study.

The method of standard tile and tube techniques using commercially prepared potent antisera was used as described by Dacie and Lewis³. Five millilitres of venous blood was collected into 10ml sterile plain test tube and the cells were separated from the serum by centrifugation. One volume of 20% cell suspension was added to two volumes of antisera and mixed by gentle rocking for a few minutes using the tile method. All the samples that showed agglutination both visually and

microscopically were read as positive while those without agglutination were recorded as negative. The method of haemagglutination inhibition technique was employed as described by Dacie and Lewis.³ Cell grouping was used to confirm the reverse (serum) grouping with known cells as controls.

Two millilitres of saliva was collected into centrifuge tubes properly labelled and placed in boiling water for 10 minutes, this inactivate salivary enzymes that may destroy blood group substances. After spinning; the clear supernatant was separated into another tube and another 2 millilitres of saliva was used as control. The saliva was mixed with diluted anti A, anti B, and anti H (product of Sigma Aldrich Germany). Antisera were added to each test tube and allowed to stand for 15minutes at room temperature. Dilutions of anti A serum to titre of 1 in 64 and anti B serum to 1 in 32 were done. Anti H (Ulex Europaeus) was prepared according to manufacturer's (Sigma Aldrich Germany) instruction with 20mg/ml of buffer so that it gives a good visible agglutination with A or B cells at the end of 1hour at room temperature. Thereafter, equal volumes of 2% cell suspension of standard cells A, B and O red cells were added to each tube, mixed and allowed to stand for 1hour at room temperature. Visual and microscopic inspection of agglutinations were observed; if the saliva contains A, B or H substances agglutination is usually inhibited but not in the saliva control.

RESULT: Two hundred and fifty six (256) subjects comprising of 127 females (49.6%) and 129 males (50.4%) were studied. The age range of subjects was 18 to 85 years with a mean age of 33.89 + 13.18 years. There was no statistical difference in age between males and females.

Blood group B had the highest number of secretors (85.3%) and majority of subjects with blood group AB were also secretors (83.3%). Blood group A and O had lesser frequency of secretors (Table 1). There was statistically significant difference between frequency of secretors in blood group B /AB and blood group A /O ($p < 0.005$).

Table 1: Distribution of Abo Blood Group and Secretor Status in Kano, North-Western Nigeria

ABO group	Secretors (%)	Non secretors (%)	Total (%)
O	86 (64.2)	48 (35.8)	134(52.3)
B	58 (85.3)	10 (14.7)	68(26.6)
A	26 (61.9)	16 (38.1)	42 (16.4)
AB	10 (83.3)	2 (16.7)	12 (4.7)

DISCUSSION

From the results of this study, the percentage of secretors was found to be highest in blood group B subjects followed by group AB while low percentages were observed in blood groups A and O with the least being in

blood group A as previously reported from other parts of Nigeria. This confirms that there is an association between blood group and secretor status in North-western Nigeria. The low prevalence of secretors found in blood group A is also in conformity with earlier reports.^{4,8} Some other reports have associated ABO blood groups and secretor status to disease susceptibility.⁸⁻¹² Blood group A non secretors which was conversely high in this study has been found to be associated with carcinoma of the stomach, prostate cancer, pernicious anaemia, coronary thrombosis in men, and venous thromboembolism compared to other blood group types.⁸⁻¹⁴

Blood group O which also had the second lowest secretor status prevalence in this study had been reported to be associated with duodenal ulcer⁸ and tuberculosis.^{9,13}

Blood group O alone may be associated with modest rise (1.3fold) in duodenal ulcer incidence while non secreting character increases the risk of developing ulcer to about 2.5, establishing their genetic linkage to diseases.^{2,9}

Our study was designed to establish the prevalence of the various blood group antigens and there secretor status. Although we did not evaluate the relationship of ABH secretor status to any disease prevalence, the finding of high prevalence of non secretors amongst blood groups A and O individuals portends the need for further studies to elucidate the pathogenic relationship between blood group secretor status and diseases in our environment.

In conclusion, determination of ABO-ABH secretor status in our population is an initial step towards identification of risk predisposition of the various blood groups. A and O non secretors were found to be prevalent in our study. These groups have been linked to cancer of the stomach and duodenal ulcer disease respectively in other parts of the world. It is hoped that our on- going studies in this regard will elucidate if similar association is present in our population.

REFERENCES

1. Peter JDA, Gregory SK. Metabolic and immunologic consequences of ABH secretor and Lewis subtype status. *Alt. Med. Rev.* 2001; 64: 390-405.
2. Daniels G. ABO, Rh, and Lewis system. In: Daniels G(ed) *Human Blood groups..* Blackwell Science Publishing, Oxford. 2002; 7-98.
3. Dacie JV, Lewis S. M. In: *Practical Textbook of Hematology 8th Edition* chapter 24. Church Hill Livingstone, Edinburgh. 1994; 445-4556.
4. The ABO, H and Lewis Blood groups and structurally related antigens. *AABB Technical Manual*, 14th edition, 2002.
5. Waft L, Roberts NB, Taylor WH. Hereditary aspects of duodenal ulceration; pepsin1 secretion in relation to ABO blood groups and ABH secretor status. *J.*

- Med. Genet. 1979; 16(6): 423-427.
6. Gang Y, Yang YS, Zhang XM et al. ABO blood type, diabetes and risk of gastrointestinal cancer in Northern China. *World J. Gastroenterol.* 2012; 14 (6): 563-569.
 7. Robinson WM, Salzano FM, Adrutti AC, Franco MH. Blood groups, salivary secretions and immunologic variables in rheumatic fever and rheumatic heart disease. *Acta Anthropogenet.* 1984; 8(3-4):217-221.
 8. Emeribe AO, Igweagu CA, Osim EE. ABH Secretor Status in Saliva of Calabar Municipality Residents. *East Afr. Med. J.* 1992; 69 (1):27-30.
 9. Odeigah P. G. Influence of groups and Secretor Genes on Susceptibility to duodenal Ulcer. *East Africa Med. J.* 1990; 67 (7):487-500.
 10. Adelusi B. Haemoglobin genotype. ABO blood groups and Carcinoma of the cervix. *J. Trop. Med. Hyg.* 1977; 80(7): 152-154.
 11. Aird I. Bentall HH. Relationship between Cancer of the Stomach and ABO Blood Groups. *Br. Med J.* 1953: 799-80.
 12. Ukaejiofor E. O and Tagbo R. N Association Between ABO Blood groups and some Carcinomas among Nigerians. A Five Year Survey: *Nigerian Post Grad. Med. Journal.* 1995; 2(3):88-91.
 13. Omoregie R, Ogefer H.O, Omokaro E U and Omorogbe E. Distribution of ABO and Rhesus Blood Group and Haemoglobin Phenotypes among Tuberculosis Patients in Benin City. *Nig J Med Lab Sci.* 2002; II (I): 68-70.
 14. Mollison PL. *Blood transfusion in Clinical Medicine* 6th Ed ELBS (ed). Blackwell Scientific Publications, Oxford. Pp 176-177.