



FREQUENCY OF BLOOD GROUP A SUBTYPES AMONG SUDANESE DONORS ATTENDING THE  
MILITARY HOSPITAL BLOOD BANK

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ABSTRACT

**Background:** Blood groups play an important role in transfusion medicine. A blood group has many subtypes, but A<sub>1</sub> and A<sub>2</sub> are the main subtypes. The percentage of these subtypes was fluctuating in an approximate average of 80% for A<sub>1</sub> and 20% for A<sub>2</sub>. This study conducted to measure the frequency of the subgroups A<sub>1</sub> and A<sub>2</sub> among Sudanese donors attending the Military hospital blood bank.

**Materials and methods:** A total of 100 venous blood samples collected randomly from blood group A donors attending military hospital blood bank between September –October 2013. Red cells were tested against monoclonal IgM anti-A and Anti-B, while the sera was tested against A<sub>1</sub>, B and O cells.

**Results and conclusion:** Among the analyzed one hundred blood samples, 74% were A<sub>1</sub> and 26% were A<sub>2</sub>. Our results was likely similar to the results obtained by other researchers worldwide.

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INTRODUCTION

The term blood group is generally based on the presence or absence of certain antigens on the RBC membrane. These are identified by characteristic agglutination reactions with specific antibodies and this field is referred to as blood group serology (Daniels 2002). The two isoagglutinins, anti-A and anti-B, occur naturally in humans, contrary to most other blood groups antibodies (Erskine and Socha 1978; Mollison *et al.*, 1993). ABO blood grouping system was established by Karl Landsteiner (Landsteiner 1900) in 1900 on the basis of the presence or absence of two antigens (A and B) on RBC and its Mendelian inheritance pattern by Bernstein in 1924 (Crow 1993). In this system, four blood groups namely A, B, AB and O are identified by blood tests. The fourth blood type (AB) was discovered by Des Casterllo and Sturli in 1902 (DesCasterllo and Sturli 1902). Except for humans, only anthropoid apes, the orangutan and the gorilla have ABO antigens on their red cells, which suggest that the red cells are the last cells during evolution to obtain the ABO antigens (Oriol *et al.*, 1986).

The ABO blood groups system is not only important in blood transfusions, cardiovascular diseases, organ transplantation, erythroblastosis in neonates, but also one of the strongest predictors of national suicide rate and a genetic marker of obesity (Molison 1979; Hein *et al.*, 2005). In 1911 von Dungern and Hirschfeld reported the distribution of blood group A (47 %),

B (11%), AB (6%) and O (36%) in Europeans, and separation of blood group A into A<sub>1</sub> and A<sub>2</sub> (Morgan and Watkins 2000). Weak subgroups of A can be defined as those of group A subjects whose erythrocytes give weaker reactions or are non reactive serologically with anti-A antisera than do those of subjects with A<sub>2</sub> RBCs (Cartron *et al.*, 1974). The A blood type contains about twenty subgroups, of which A<sub>1</sub> and A<sub>2</sub> were the most common (over 99%). A<sub>1</sub> makes up about 80% of all A-type blood, while the A<sub>2</sub> making up the rest. These two subgroups are interchangeable as far as transfusion is concerned, but complications can sometimes arise in rare cases when typing the blood (The Owen Foundation 2008).

Sera from blood group A individuals contain anti-B antibody while B individuals' sera contain two types of antibody against A antigens. The first is anti-A and the second one is specific towards A<sub>1</sub> RBCs. Anti-A reacts with both A<sub>1</sub> and A<sub>2</sub> cells whereas the second only does with A<sub>1</sub> RBCs. Anti-A<sub>1</sub> is also present in some A<sub>2</sub> and A<sub>2</sub>B individuals (Landsteiner and Levine 1926). The two most common subgroups of blood group A are A<sub>1</sub> and A<sub>2</sub> expressing on average, 1 million and 250,000 A determinants, respectively (Economidou *et al.*, 1967). This study was designed to gives insight about the frequencies of these two major subgroups among Sudanese donors attending the military hospital.

MATERIALS AND METHODS

This was cross-sectional study done on a total of 100 venous blood samples collected randomly from blood group A donors

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attending military hospital blood bank between September – October 2013. In order to determine subgroup of A. red cell were tested against monoclonal IgM anti-A and Anti-B, while the sera was tested against A1, B and O cells. A total of 7 ml of venous blood samples were collected from donors 3.5 ml in (EDTA) vacuococontainer and another 3.5 ml in plain containers. Direct blood grouping was done using 5% of the red blood cells suspension of the donor against anti-A and anti-B antisera. Two drop of 5% of the red blood cells suspension of A blood group sample was divided into two different tubes, One drop of anti A1 antisera was added to the first tube and one drop of anti AB antisera was added to the other tube, the two tubes were centrifuged at 5.000 rpm for twenty seconds. 15 (any negative results were obtained with anti A1 antisera was confirmed by examination under the light microscope). For the indirect grouping, six drops of serum from each A blood group sample was added into three test tube (two drops in each tube) and then one drop of known A1, B and O cells were added in each tube and centrifuged at 5.000 rpm for twenty seconds. (Denise M. Harmening 2005)

## RESULTS AND DISCUSSION

A<sub>1</sub> constituted approximately 80% of entire A blood group population and group A cell which react with anti-A and not agglutinate with anti-A<sub>1</sub> are classified as A<sub>2</sub>, making up of remaining 20%. This result is approximately agreed with our results which showed that 74 samples (74%) were A<sub>1</sub> and the remaining 26 samples (26%) were A<sub>2</sub>. The differences between the published data and the result we obtained might be due to the number of samples examined.

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### Conflict of Interest

The Authors declare that they have no conflict of interest

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