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Original Article

Efficacy and accuracy of ABO blood group determination from saliva

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ABSTRACT

The ABO blood group framework was the huge component for legal serological examination of blood and body fluids in the past before the wide adjustment of DNA writing. A critical extent of people (80%) is secretors, implying that antigens present in the blood are likewise found in other body fluids, for example, saliva. Absorption inhibition is one such strategy that works by lessening quality of an antiserum in light of sort and measure of antigen present in the stains. To check the efficacy of identifying the blood group antigens in saliva and to know the secretor status using absorption inhibition method among individuals in Saveetha Dental College and Hospitals. Blood and saliva samples were collected from five individuals with different blood group. The inhibition absorption technique was utilized to decide the blood group antigens in the salivation, and afterward, the outcomes were corresponded with the blood group of the gathered blood test. Using absorption inhibition method, this sample gave results that matched with blood. Blood Groups A, B, and O revealed 100% secretor status for both males and females. Saliva as stains is experienced as physical confirmation. In many cases, for example, rape, murder, disputed paternity, cigarette butt closes, and so on. Hence, secretor status evaluation of the ABO blood group antigen in saliva using absorption inhibition method can be a useful tool in forensic examination.

Keywords: ABO blood group, antiserum, salivary antigen, blood grouping

Introduction

Karl Landsteiner found ABO blood groups in blood in mid-1900, regardless, it remains the pillar of blood group examinations in crime scene investigation.[1] The purposes behind this are it is the essential, most regular, prominent, and effectively noticeable groups. Later on, it was found that these blood group particular antigens were not the selective space of the erythrocyte but rather richly show in numerous other substantial emissions such as sweat, semen, and even salivation.[2]

Two alternatives prevail in the molecular premise of the secretor framework. An individual can be a secretor (Se) or a nonsecretor (se) which is totally free of whether the individual is of blood classification A, B, AB, or O, recommending that somebody can be an A secretor or an A nonsecretor, a B secretor or a B nonsecretor.[3] In simple terms, a man is said to be a secretor on the off chance that he or she secretes their blood group antigens into their body liquids such as the salivation and the bodily fluid, though then again, a nonsecretor does not put or if so at all almost no of their blood group antigens into these fluids.[4]

Although anti-A and anti-B hemagglutinins in saliva were analyzed in 1928, it was however not used as proof in the medico-legitimate cases because of inadequate procedures accessible those days.[5] In past few years, many modified techniques have been introduced and many investigations have shown up to 100% accuracy in determining ABO blood group from saliva.[6] The two tests are used to detect ABO blood group and other blood group systems from body fluids are absorption.

Inhibition and absorption elution methods

Absorption inhibition method was introduced by Vittorio Siracusa in 1923, in Italy.[7] Other than blood, these antigens are emitted in different other body secretions from which blood group can be resolved. This strategy works by decreasing the quality of antigens present in the stains.[8] In the present study, an attempt has been made to decide the blood group antigens in saliva and to check the adequacy of inhibition absorption technique to do likewise.[9]

Materials and Methods

Materials

A cross-sectional study was carried out in the year 2016 (April to June) among the student's systemically healthy individuals. The study was

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conducted in Saveetha Dental College; six random students are chosen with different blood Group (A, B, and O). There were no criteria set for this study as students chosen were selected on random basis with volunteering enforcement by students themselves.

Methods

Preliminary test for alpha-amylase

The given blood samples were placed in a small piece of wet gauze and allowed to air dry at room temperature for 1 h. Each gauze containing a saliva sample was kept in a test tube containing 5 mL of distilled water and kept undisturbed for overnight. 0.5 mL of the resultant solution added with 3.5 mL of buffered starch and incubated at 37°C for 30 min. 0.75 mL of conc. Sulfuric acid and 0.25 mL of sodium tungstate were added. This solution was centrifuged for 10 min. 2 mL of the resultant supernatant was added with 2 mL of copper sulfate alkaline and boiled in a water bath for 10 min. After cooling, 2 mL of phosphomolybdic acid was added. Formation of blue color indicates the presence of alpha-amylase and the remaining extract was used as fresh saliva sample if positive.

Absorption inhibition method

In this method, the denatured saliva after cooling was taken in two test tubes. A and B antisera in the dilution of 1:10 were added to each test tubes, and the test tubes were, respectively, labeled. A singe drop of saliva was added to both the test tubes thoroughly shaken and incubated at 37° for 10 min. After 10 min, a single drop of freshly prepared pooled RBC of known group was added to the respective test tubes and shaken well and further incubated for 15 min at 37° and checked for agglutination. In this test, the absence of agglutination was considered a positive result for a particular blood group.

Results

Blood grouping by absorption inhibition method. In this study, all samples showed corresponding blood groups (A, B, and O) which exactly matched with the secretor.

Discussion

In the present work, a delicate strategy for the recognition of anti-A and anti-B hemagglutinin in fresh saliva has been developed. Salivary anti-A and anti-B hemagglutinin are conceivably imperative since it is conceivable to decide an individual's ABO blood group by examination of these antibodies.[10] Absorption inhibition method was the first devised method to detect the blood group substances from body fluids. Absorption elution was later created.

Table 1: Blood grouping by absorption-inhibition method

Samples	Antisera A and B blood group of RBC suspension added	Visible clumping blood group determined by absorption-inhibition method
Sample 1	✓A	X A
	✓B	✓B A
Sample 2	✓A	✓A
	✓B	X B B
Sample 3	✓A	X A
	✓B	✓B A
Sample 4	✓A	X A
	✓B	✓B A
Sample 5	A	✓A
	B	✓B O

After the approach of blood group framework by Karl Landsteiner in 1900, the ABO blood group and Rh framework dispersions have indicated marked variation around the world, furthermore, some variety in various areas inside the same country.[11] It has been accounted for by different studies that the O blood classification being regular in American, Canadian, and Saudi populace, the B sort in Chinese and Indian people, and the A sort in Eskimos. The source of blood gathering antigens is the water solvent substances that are available in most body fluids and organs of a secretor. Yamakami found the presence of A and B antigens in salivation.

This offered approach to note in 1930 by Lehrs and Putko that secretors or nonsecretors existed for these antigens as two particular groups.[12] With the idea once a blood group is set up in an individual, it stays unaltered for the duration of his life, the utilization of blood group substances is situated in medicolegal examination. Blood group would be resolved with 100% precision from the salivation of those subjects who were secretors of antigens in their saliva.[13]

The utilization of saliva in forensic science depends on the presence of ABO blood group substances in the salivation of secretors in genuinely high concentration. Since salivation might be found on different substance at the scene of a crime, care must be taken that this confirmation must not be disregarded or misused.[14] The discoveries are constantly utilized as a part of a negative way, i.e., they can disprove that a blood stain or secretion at a scene of the crime originates from a blamed person. At the point when found at crime scene, the blood substances in secretion and tissues are more complex to recognize when compared with blood itself.[10] Indeed, even in the fresh state, the main antigens that can be distinguished are A, B, and O, and these requires more complicated techniques. On the off chance that the specimens are weakened and exhibit in little sum, the unwavering quality of the tests is still further restricted. However, the examination of secretion and tissues might be helpful in comparing discoveries from blood tests and might be especially profitable without blood.

From the discoveries of the study, we infer that absorption-inhibition technique is a more exact strategy for recognizable proof and determination of secretors.[12] As a dental specialist, however, we cannot coordinate the current confirmation to dental records of same individual, we can give critical insights into character which may help the examiners. For instance, age, socioeconomic class, and history can be formulated based on mere examination of the teeth. At last correlating these evidences with those from forensic investigators, the identity possibilities can be narrowed down.

Conclusion

In the present study, 100% secretor status was seen with blood group A and O for both male and females. The identification of blood group antigens in different body liquids like salivation essentially would be

a valuable device in measurable examination. It was concluded that absorption-inhibition method is a better method for determination of secretors. This method is useful in crime scene and for identification of mass disaster.

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