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Agglutination Resistant Ingested Blood from Cimex lectularius Specie of Bed Bug

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Abstract
Bed bugs are parasitic in nature and feed exclusively on blood. Feeding on multiple hosts with different blood groups also means the risk of ingesting incompatible blood that may agglutinate in their gut. Eight groups of ten *Cimex lectularius* specie of bed bug each starved for 4 days were placed in opaque plastic jar to keep dark. 0.5 ml of citrated blood pre-heated in an incubator to the temperature of 37 degree centigrade was packed in 8 units of silicone free latex material. Each group of 10 bugs was given different blood group type ranging from blood group A+ve, B+ve, AB+ve, O+ve, A-ve, B-ve, AB-ve and O-ve. 5 engorged bugs that attached to the latex and sucked the bloods therein within 24 hours from each group were opened and the blood ingested was harvested and blood group determined by slide method and agglutination verified with microscope. The entire blood grouping conducted in all the groups turned out O-ve. Thirty four young men living alone in a slum area with high prevalence of bed bug infestation volunteered to provide the blood engorged parasites from their rooms for testing of the ingested blood. 19 of the volunteers were blood group O +ve, 6 were B+ve, 5 were AB+ve and 4 were A+ve. All the blood tested turn out O –ve, the complete failure of agglutination reactions to manifest with the corresponding Antisera. A factor(s) possibly exist that ablate the antigenicity of ABO and Rhesus agglutinogens of the blood ingested by *Cimex lectularius*.
Keywords: Bed bug, Cimex lectularius, ingestion, agglutination, Antisera

INTRODUCTION

Bed bugs are parasitic insects and they feed exclusively on blood (Narinderpal, 2012). Haematophagous Parasitic organisms like tick, the vampire worm *Hirudinae medicinalis* and mosquito have evolved abilities to prevent blood clotting during blood meal. The successes recorded with research and development of hirudin as a drug, originally an enzyme from leech, went on a roller coaster from the evaluation of medicinal use of the live leeches in bloodletting, to the establishment of the amino acid sequence in the protein enzyme in leech that prevents clotting and then corresponding gene for hirudin. Recombinant biosynthesis of hirudin became a commercial success and the scientific world is looking forward to achieving such feat in many areas. Hirudin now is available along-side heparin for various modalities of treatment (Malinovsky, 1979).

When bed bug feed on a number of hosts (Goddard, 2009) and with different blood groups, it also means the risk of ingesting incompatible blood that may agglutinate in their gut. Studies have been conducted on anti-clotting nature of some factors in arthropods during blood meal but there is very little number of scientific researches on agglutination reaction. Lansteiners laws clearly establish baselines for blood group antigens and antibodies and these are agglutinogens and agglutinins. ABO and Rhesus antigens are among the most powerful antigens that are frequently evaluated for the purpose of diagnosis (ABO and Rhesus incompatibilities) and treatment (blood transfusion) in clinical settings. The red cell agglutinogens are still relevant and reactive even in the end stage of their degradation as ghost red blood cell (Mohn, 1977).

AIM AND OBJECTIVE

This study aims at studying the agglutination reaction of ABO and Rhesus agglutinogens in blood ingested by bed bugs in control laboratory setting and those bugs from the wild (non-laboratory source). This study tries to find modification to agglutination in response to ingestion by the haematophagous insect *Cimex lectularius.*

MATERIAL AND METHODS

Eight groups of ten *Cimex lectularius* specie of bed bug each were starved for 4 days and placed in foam-padded opaque plastic jar to keep warm in dark. 0.5 ml of citrated blood pre-warmed in an incubator to the temperature of 37 degree Celsius was packed in 8 units of silicone free latex material. Each group of 10 bugs was given different blood group type ranging from blood group A+ve, B+ve, AB+ve, O+ve, A-ve, B-ve, AB-ve and O-ve. 5 engorged bugs that attached to the latex and sucked the bloods therein within 24 hours from each group were sacrificed and the blood ingested was harvested and blood group determined by slide method and agglutination verified with microscope. Thirty four young men living alone (single person room) in a slum area with high

prevalence of bed bug infestation volunteered to provide the blood engorged parasites from their rooms for sacrifice and testing of the ingested blood. 19 of the volunteers were blood group O +ve, 6 were B+ve, 5 were AB+ve and 4 were A+ve.

RESULTS

In the in vitro study, the entire blood grouping conducted in all blood specimens taken from the ingested blood of bugs fed the various ABO and Rhesus blood turned out without agglutination with the anti sera A, B, AB and the Anti sera D.

Table 1. Showing various blood group types fed bed bugs and subsequently harvested and tested with antisera to evaluate the agglutinogen type reacting (agglutination).

Serial Number	1	2	3	4
Blood Group Type	A	B	AB	Rhesus +ve (from A, B, AB and O ABO type)
Agglutinogen Present	A	B	A and B	D
Reaction observed in response to addition of Corresponding anti sera	No agglutination reaction	No agglutination reaction	No agglutination reaction	No agglutination reaction

The thirty four young men living alone in single rooms in a slum area with high prevalence of bed bug infestation volunteered and provided the blood engorged parasites from their rooms for sacrifice and testing of the ingested blood. 19 of the volunteers were blood group O +ve, 6 were B+ve, 5 were AB+ve and 4 were A+ve.

DISCUSSION

100% failed agglutination at room temperature of 30^{o}C seen with all the listed agglutinogens and the corresponding anti sera suggests the existence of factor(s) that prevent or ablate the antigenicity of ABO and Rhesus agglutinogens of the blood ingested by *Cimex lectularius*. This could be a phylogenetic adaptation to offset the risk of agglutination in response to ingestion of blood from different hosts with different blood group type that may constitute problem similar but not necessarily the same with clotting of blood (Biggs, 1972). If and when this factor(s) is identified in the future, it may be employed in the management of transfusion reactions and in the use of blood for transfusion irrespective of the blood group type (Hubbell, 1979).

References

1. Narinderpal Singh; Changlu Wang; Richard Cooper; Chaofeng Liu. (2012) "Interactions among Carbon Dioxide, Heat, and Chemical Lures in Attracting the Bed Bug, Cimex lectularius L. (Hemiptera: Cimicidae)". Psyche 2012. doi:10.1155/2012/273613.
2. Malinovsky, N.N., and Kozlov, V.A. (1979). Anticoagulant and thrombolytic Therapy in Surgery. In St Louis, C.V. Mosby (ed)
3. Goddard, J; deShazo, R (2009). "Bed bugs (Cimex lectularius) and clinical consequences of their bites". JAMA: the Journal of the American Medical Association 301 (13): 1358–66. doi:10.1001.
4. Mohn, J.F., et al (1977). Human blood Groups. In New York, S. Karger (eds).
5. Biggs, R. (1972). Human blood Coagulation Haemostasis and Thrombosis. In Philadelphia. J. B. Lippin cott Co (ed).
6. Hubbell, R.C. (1979). Advances in blood transfusion. In Arlington Va, American blood commission (Ed).