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ANALYSIS OF MECHANISM OF GENETIC POLYMORPHISMS WITH THE ASSOCIATION OF BLOOD TRANSFUSION IN HUMAN LEUKEMIA DISEASE

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Abstract:
Objectives: *The main objective of this study is to find the mechanism of Genetic polymorphisms with the association of blood transfusion in human leukemia disease.* ***Material and methods:*** *This descriptive study was conducted in Icahn School of Medicine Mount Sinai, New York USA during March 2019 to November 2019. All histologically confirmed cases of leukemia diagnosed from 2015 to 2013in a Shalimar hospital was selected for study. Enrollment criteria include the age between 20 to 50 years. Pathology slides from all patients were obtained from the original pathology departments and reviewed by two independent pathologists. All cases in this study were classified according to the World Health Organization classification system.* ***Results:*** *Blood transfusion is not associated with the risk of leukemia. According to data CLL is not related to blood transfusion (OR=0.7 at 95% CIL) and DLBCL (OR=0.9 at 95% CIL).* ***Conclusion:*** *Our results suggest that genetic polymorphism in TNF gene modifies the association between blood transfusion and risk of leukemia B-cells.*

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INTRODUCTION:

The age of genomics has enabled the application of DNA-based molecular methods to clinical laboratory diagnostic testing in the areas of genetics. Molecular methods are also applicable to blood bank and transfusion service testing[1]. The rapid progress made in determining the genetic basis for blood group and platelet antigen polymorphisms, and the commercial development of polymerase chain reaction (PCR) based technology, makes detection of blood group antigens by probing the gene now possible. Many blood group antigens are the result of single nucleotide gene polymorphisms or SNPs) inherited in a straightforward mendelian manner.

Before 19th century it was thought that all the blood was same and this misunderstanding was lead to the fetal transfusion of blood. Even human blood is not the same. People belong to the different blood groups depending upon the antigens present in the blood. Almost 25 different types of blood groups were present but most common are ABO and Rh systems[2].Blood transfusion mainly allogeneic blood transfusion can induce immune supression and has been suggested as a risk factor for leukemia[3]. Molecular genotyping methods were introduced to the transfusion medicine community over a decade ago. Epidemiological studies linking blood transfusion to the risk of leukemia but they provided inconsistent results[4]. B-lymphocytes are characterized by the expression of CD19 surface antigen, which is present on the progenitor cells of bone and persists during all stages of B-cell maturation[5].

Objectives of the study

The main objective of this study is to find the correlation of genetic polymorphisms which modify the association of blood transfusion in human leukemia

MATERIAL AND METHODS:

This descriptive study was conducted in Icahn School of Medicine Mount Sinai, New York USA during March 2019 to November 2019. All histologically confirmed cases of leukemia diagnosed from 2015 to 2013in a Shalimar hospital was selected for study. Enrollment criteria include the age between 20 to 50 years. Pathology slides from all patients were obtained from the original pathology departments and reviewed by two independent pathologists. All cases in this study were classified according to the World Health Organization classification system.

Participation of all the patients were voluntary and written consent was obtained from all participants. Those who want to participate and signed consent were interviewed by medical staff by using a standardized and structured questionnaire and personal interview. Blood transfusion history was also examined by asking subjects whether they transfuse blood first time or this were a long term process.

STATISTICAL ANALYSIS

All *P* values presented in the results are two-sided, and all analyses were performed by using SAS software (version 9.2).

RESULTS:

The association between blood transfusion and leukemia B-cells are clearly presented in the table 3. Blood transfusion is not associated with the risk of leukemia (OR=0.9 at 95% CIL) and B-cell lymphoma (OR=0.8 a 95%CIL). According to data CLL is not related to blood transfusion (OR=0.7 at 95% CIL) and DLBCL (OR=0.9 at 95% CIL).

Table 01: Association between blood transfusion and leukemia B-cells

	Overall			**B-cell lymphoma**	
Blood transfusion	**Control**	**Case**	**OR (95%CI)**	**Case**	**OR (95%CI)**
No **Yes**	124 417	98 384	1.0 0.9 (0.7–1.2)	311 75	1.0 0.8 (0.6–1.2)
	DLBCL			**CLL**	
Blood transfusion	**Control**	**Case**	**OR (95%CI)**	**Case**	**OR (95%CI)**
No **Yes**	124 417	29 121	1.0 0.9 (0.6–1.4)	78 26	1.0 0.7 (0.4–1.2)

We also collected the patient's history and compared this data to those patients who have not the history of blood transfusion. The patients who have the history of blood transfusion are suffering from high risk of leukemia if they carried TNF GG genotype (OR = 1.9, 95% CIL) (Table 02).

Table 02: Associations between *IL10RA* and *TNF* Polymorphisms, Blood Transfusion, and risk of leukemia

	Overall						**B-cell lymphoma**			
	Blood transfusion						**Blood transfusion**			
	No			**Yes**			**No**		**Yes**	
SNPs	**Control**	**Case**	**OR**	**Control**	**Case**	**OR**	**Cases**	**OR**	**Cases**	**OR**
TNF										
GG	289	**277**	**1.0**	**96**	67	0.7	221	1.0	44	0.7
AG/AA	123	**108**	**1.0**	**27**	34	1.6	88	1.0	22	1.5
P-interaction	**0.011**						**0.013**			

DISCUSSION:

This is the first comprehensive analysis of relation of blood transfusion and risk of leukemia in humans. There is a significant difference were observed in for *IL10RA* and *TNF* for leukemia and the high production of white blood cells. No interactions were observed for blood transfusion and the high production of white blood cells. For the clarification of this statement higher studies will required for further clarification[6].

The IL-10RA receptor chains have an extracellular domain consisting of 200 amino acids, a transmembrane helix consisting of 20 amino acids, and an intracellular domain consisting of 322 amino acids for IL-10RA[7]. IL10 and TNF were considered to be the key genes for lymphomagenesis. Both the genes code the immune regulatory cytokines that are considered to be critical mediators of inflammation and apoptosis and also for lymphoid tumors[7]. Different studies related to TNF and IL10 shows that each cell effects on B-cell lymphomagenesis by direct or indirect way[8].

The long term storage of red blood cells before transfusion has been reported and it can increase the intera cellular iron. And they cause the systemic inflammatory response syndrome and it will lead to deleterious consequences[10-11].

CONCLUSION:

Our results suggest that genetic polymorphism in TNF gene modifies the association between blood transfusion and risk of leukemia B-cells.

REFERENCES:

1. Brunson ME, Alexander JW. Mechanisms of transfusion-induced immunosuppression. Transfusion 1990; 30: 65 1–658.
2. Blumberg N, Heal JM. Effects of transfusion on immune function. Cancer recurrence and infection. Arch Pathol Lab Med 1994; 118: 371–379.
3. Triulzi DJ, Heal JM, Blumberg N. Transfusion-induced immunomodulation and its clinical consequences. In: Nance SJ, editor. Transfusion Medicine in the 1990′s. Arlington, VA: American Association of Blood Banks; 1990. pp 1–33.
4. Klein HG. Immunomodulatory aspects of transfusion: A once and future risk? Anesthesiology 1999; 91: 861–865.
5. Castillo JJ, Dalia S, Pascual SK. Association between red blood cell transfusions and development of non-Hodgkin lymphoma: A meta-analysis of observational studies. Blood 2010; 116: 2897–2907.
6. Lan Q, Zheng T, Rothman N, et al. Cytokine polymorphisms in the Th1/Th2 pathway and susceptibility to non-Hodgkin lymphoma.Blood 2006; 107: 4101–4108.
7. Rothman N, Skibola CF, Wang SS, et al. Genetic variation in TNF and IL10 and risk of non-Hodgkin lymphoma: A report from the InterLymph Consortium. Lancet Oncol 2006; 7: 27–38.
8. Liese AM, Siddiqi MQ, Siegel JH, et al. Augmented TNF-alpha and IL-10 production by primed human monocytes following interaction with oxidatively modified autologous erythrocytes. J Leukoc Biol 2001; 70: 289–296.
9. Li, T., Francl, J. M., Boehme, S., & Chiang, J. Y. Regulation of cholesterol and bile acid homeostasis by the cholesterol 7alpha-hydroxylase/steroid response element-binding protein 2/microRNA-33a axis in mice. Hepatology,2013; 58(3), 1111-1121.
10. Khatri VP, Caligiuri MA. A review of the association between interleukin-10 and human B-cell malignancies. Cancer Immunol Immunother 1998; 46: 239–244.
11. Aggarwal BB. Signalling pathways of the TNF superfamily: A double-edged sword. Nat RevImmunol 2003; 3: 745–756.