Original Article

FREQUENCY OF ABO AND RH(D) BLOOD GROUPS IN FIVE GOVERNORATES IN GAZA-STRIP

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ABSTRACT

Objective: To document the frequency of ABO and Rh(D) blood groups in five regions in Gaza-Strip.

Methodology: ABO and Rh (D) typing was carried out over a period of three months, included 14,916 (13,691 retrospective and 1,225 prospective) subjects from both genders, collected from records of hospitals and students of Laboratory Medicine Department at Al-Azhar University - Gaza, respectively. A finger prick blood samples (1,225) from both genders were tested for ABO and Rh(D) blood groups by routine slide method.

Results: The blood group "O" was the predominant (38.1%) in both Rh positive and negative subjects among the five governorates in Gaza-Strip, except in Gaza city and Rafah where the blood Group-A was the highest (11.4%, 4.5%) respectively**.** The percentage of Rh (D) positive and negative subjects was (83.3%) and (10.7%) respectively.

Conclusion: The frequency of ABO blood groups in both Rh positive and negative subjects among the five governorates in Gaza-Strip was O>A>B>AB, except in Rafah and Gaza city governorates where the blood group A was the commonest among Rh positive subjects.

KEY WORDS: ABO, Rh(D), Blood groups.

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INTRODUCTION

The date of 1901 represents the most important achievement in the history of blood transfusion through the discovery of the ABO blood groups by Karl Landsteiner. Forty years later, both Landsteiner and Wiener discovered Rh(D) antigen.[1,2] The genes of ABO and Rh (D) are located on chromosome 9 and 1 respectively. The bombardment of the red blood cells with A and/or B antigens occurs as a consequence of the action of the glycosyltransferases enzymes, that add specific sugars to the precursor substance.[3] However, a group of conformation- dependent epitopes along the Rh (D) protein form the D antigen.[4] The Landsteiner's discovery was a monsoon, as it opens the door to the birth of a wide spectrum of discoveries in the field of immunohaematology. Blood transfusion among humans irrespective of their natives, unmatched-pregnancy, legal medicine,[5] anthropology and the discovery of other blood group systems,[6] all are deemed as an applications or as a result of Karl's discovery. It was found that there are differences in the distribution of ABO and Rh(D) blood groups amongst different populations of the world.[7-17] Our study was planned to be

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comprehensive as recommended by a previous study,[18] to document the frequency of ABO and Rh(D) in five regions in Gaza-Strip.

SUBJECTS AND METHODS

Area of study: The study area was Gaza-Strip in Palestine, is a narrow coastal strip of land along the Mediterranean, in the Middle East, and forms the western most portions of Palestinian territories in Southeast Asia. Around 1.4 million Palestinian live in an area of 360 km^2, consists of five governorates (North Gaza, Gaza, Deir Al-Balah, Khan Younis & Rafah).[19]

Subjects: Over three months period, a total of 14,916 (13,691 retrospective and 1,225 prospective) subjects of both genders were collected from records of the major hospitals in Gaza-Strip (Al-Shifa, Kamal Edwan, Nasser, Abu-Yousif El-Najar and Al-Aqsa) and students of Laboratory Medicine Department of Al-Azhar University Gaza, respectively. The sample distribution was approximately proportional to population size in each governorate.

Ethical Consideration: The protocol was admitted by Laboratory Medicine Department, Faculty of Applied Medical Sciences of Al-Azhar University Gaza, hospitals and health care centers for collection of the retrospective data. While collection of the prospective data and blood samples have been approved only by Laboratory Medicine Department. Both retrospective and prospective data were confidentially kept. Three sheets were given to each student who accepted to participate in the study (finger puncture form, finger prick consent and questionnaire), the first sheet was a declaration from each participant that s/he understood every word about the project, the second included information about the procedures of ABO and Rh(D) blood groups and the student was physically and mentally able to participate in this project and every one will personally receive the result. While the last sheet was a brief questionnaire that included demographic data related to participants.

Collection of blood sample: The blood samples were collected by finger prick with sterile lancet, after warm and clean the puncture set with 70% ethyl alcohol.

Procedure: A drop of monoclonal anti-A, anti-B and monoclonal/polyclonal anti-D (Labkit, Barcelona, Spain) was added to a drop of finger prick blood on clean slide and mixed well. Results of agglutination were recorded immediately for ABO blood groups and after 2 minutes in Rh(D).

RESULTS

The distribution of ABO blood groups in both Rh(D) positive and negative subjects are illustrated in Table-I&II respectively. Overall blood group-O was the highest (38.1%) among both Rh positive and negative subjects, while the AB blood group was the lowest (7.5%). In each governorate of Gaza–Strip, the blood group-O was the highest with the exception of Gaza city and Rafah, where the blood group-A was the highest in subjects who have the D antigen.

Comparison of distribution of ABO blood groups between present study and some neighbor countries is shown in Table-III. Rh(D) positive subjects were about 8 times (13,315) than Rh(D) negative (1601).

DISCUSSION

The need for blood group prevalence studies in Gaza-Strip is not only important for blood

Table-I: Spectrum of ABO, Rh(D) positive in five governorates in Gaza –Strip.

Governorates ABO	*O*	*A*	*B*	*AB*
North Gaza	885 (5.9%)	696 (4.7%)	557 (3.7%)	171 (1.1%)
Gaza	1667 (11.2%)	1698 (11.4%)	1133 (7.6%)	422 (2.8%)
Deir Al -Balah	626 (4.2%)	608 (4.1%)	351 (2.4%)	133 (0.9%)
Khan –Younis	1121 (7.5%)	756 (5.1%)	457 (3.1%)	109 (0.7%)
Rafah	665 (4.5%)	677 (4.5%)	396 (2.6%)	187 (1.3%)
Total	4964 (33.3%)	4435 (29.8%)	2894 (19.4%)	1022 (6.8%)

Table-II: Distribution of ABO, Rh(D) negative in five governorates in Gaza –Strip.

Governorates ABO	*O*	*A*	*B*	*AB*
North Gaza	89 (0.6%)	56 (0.4%)	38 (0.3%)	16 (0.11%)
Gaza	231 (1.5%)	199 (1.3%)	123 (0.8%)	53 (0.35%)
Deir Al -Balah	97 (0.7%)	66 (0.4%)	32 (0.2%)	22 (0.1%)
Khan –Younis	218 (1.5%)	131 (0.9%)	62 (0.4%)	14 (0.1%)
Rafah	72 (0.5%)	46 (0.3%)	30 (0.2%)	6 (0.04%)
Total	707 (4.8%)	498 (3.3%)	285 (1.9%)	111 (0.7%)

transfusion, organ transplantation and genetic research, but also in evolution that helps scientists to understand the place humans occupy in evolution's branching tree.[20]

Blood group-O was the predominant (38.1%) and AB was the least common (7.5%) blood group in both Rh(D) positive and negative subjects amongst the five governorates in Gaza-Strip, except in Rafah and Gaza city where blood group-A was the highest in Rh(D) positive subjects (Table-I).

A similar distribution of ABO blood groups to our study was found in West Bank, Saudi Arabia, Egypt, Sudan, Iraq, Libya and Kuwait.[7-12] However, other countries such as Syrian Arabs, Lebanon, Israel, Jordan and Tehran[13-17] have a different ABO spectrum in which blood group-A is the predominant (Table-III).

This spectrum difference may be attributed to sampling error, genetic factors,[21] natural selection which is affected mainly by traditions and habits (exogamy, endogamy).

Rh(D) positive individuals reported the highest percentage in this study and this is in agreement with previous studies.[7-18] The present study is original in that, it's the first comprehensive study that documented the frequency of ABO and Rh (D) blood groups among five governorates in Gaza-Strip. From our view point, this could have a significant implication to the major two blood bank centers at Al-Shifa and Al-Aqsa hospitals in both Gaza city and Deir-El Balah respectively, where certain blood groups are needed more than others in emergency conditions, especially we do live in a flammable area, due to the Israeli-Palestinian conflict. In addition, to give the chance for researchers to explore the reasons of increasing of one blood group to another by linked genetic influences and effects of inter and intra marriage.

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Table-III: Comparison of ABO Blood group of present study with neighboring countries.

Country ABO	*O*	*A*	*B*	*AB*
Present study*	38.1%	33.1%	21.3%	7.5%
Gaza city [18]	32.9%	39.3%	21.3%	6.5%
West Bank [7*]	46%	36.7%	13%	3.7%
Saudi Arabia [8*]	52%	24%	17%	4%
Egypt [9*]	36.44%	33.94%	20.96 %	8.65%
Syria [13]	37.5%	46.25%	13.13%	3.12%
Lebanon [14]	36.11%	47.25%	11.52%	5.12%
Israel [15]	38%	40%	16%	6%
Jordan [16]	36.62%	38.36%	18.04%	6.98%

* Countries with high frequency of blood group "O"

REFERENCES

1. Garratty G, Dzik W, Issitt PD, Lublin DM, Reid ME, Zelinski T. Terminology for blood group antigens and genes – historical origins and guideline in the new millennium. Transfusion 2000;40:477-89.
2. Mollison PL. The genetic basis of the Rh blood group system. Transfusion 1994;34:539-41.
3. Technical Manual of American Association of Blood Banks: Chapter 9: Blood Group and Genetics, 12 edition. American Association of Blood Banks 1996;173-261.
4. Avent N, Reid M. The Rh blood group system: A review, Blood 2000;95(2):375-87.
5. Jolly JG. Medicolegal significance of human blood groups. J Indian Med Assoc 2000;98:340-1.
6. Khurshid B, Naz M, Hassan M, Mabood SF. Frequency of ABO and Rh (D) blood groups in district Swabi N.W.F.P (Pakistan). J Sci Tech University Peshawar 1992;16:5-6.
7. Shayeh A, Feudy AH. Distribution of ABO blood groups and the Rh factor in Palestinian living in Northern part of the West Bank. Najah Res J 1988;2(1):35-41.
8. Bashwari LA, Al-Mulhim AA, Ahmad MS, Ahmed MA. Frequency of ABO blood groups in Eastern region of Saudi Arabia. Saudi Med J 2001;22(11):1008-12.
9. Awny AY, Kamel K, Hoerman KC. ABO blood groups and hemoglobin variants among Nubian Egypt. UAR Amer J Phys Anthro 1965;23:81-2.
10. Khalil IA, Phrykian S, Farr AD. Blood group distribution in Sudan. Gene Geogr 1989;3(1):7-10.
11. Al- Khafaji SD, Al-Rubeaj MA. The frequencies of ABO and Rh(D) blood groups in Kurdish population of Iraq. Ann Hum Biol 1976;3(2):189-91.
12. Al-Bustan S, El-Zawahri M, Al-Azmi D, Al-Bashir AA. Allele frequencies and molecular genotyping of the ABO blood group system in a Kuwaiti population. Int J Hematology 2002;75(2):147-53.
13. Sakharov RS, Nofal'Kh K. The frequency of ABO blood groups and the expression of group antigens and isohemagglutinins in Syrian Arabs. Sud Med Ekspert 1996;39(2):34-6.
14. Nasif E. The incidence of blood groups in Lebanese. Lebanon Med J 1953;6:346-9.
15. Mourant, AE, Kipec, Ada C. Domaniewska-Sobezak, Kazimiera. The Distribution of Human Blood Groups. Oxford University Press, London 1976.
16. Hanania S, Hassawi D, Irshaid N. Allele frequency and molecular genotypes of ABO blood group system in Jordanian population. J Med Sci 2007;7(1):51-8.
17. Ami-ud-Din M, Fazeli N, Rafiq MA, Malik S. Serological study among the municipal employees of Tehran, Iran. Distribution of ABO and Rh blood groups. Hematology 2004;7(4):502-4.
18. Skaik Y, El-Zyan N. Spectrum of ABO and Rh(D) blood groups amongst the Palestinian students at Al-Azhar University-Gaza. Pak J Med Sci 2006;22(3):333-5.
19. Wikipedia: Gaza Strip, http://en.wikipedia.org/wiki/Gaza_Strip. December 2006.
20. Mollison PL, Engelfriet CP, Conteras M: ABO, Lewis Ii and P Groups. In Blood Transfusion in Clinical Medicine, Editors: Mollison PL, Engelfriet CP, Conteras M, Oxford: Blackwell Scientific Publications, 9th Edition, Chap 1993;4,150-51.
21. William A, Harry N, Robert J, Lynn K. Understanding Physical Anthropology and Archeology, Chapter 6: Contemporary Views of Human Variation 1998;112.