

Frequency of ABO and Rh Blood Group Distribution at Debre Tabor Blood Bank, Amhara Region, North-Central Ethiopia. A Six-Year Retrospective Survey

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Introduction: Blood is arranged into four groups based on their surface antigen (A, B, AB, and O). In addition to this classification based on the Rhesus factor, each blood group clustered into RH positive and RH negative. This study was done to identify the distribution of blood group and rhesus factors on the local blood bank.

Objective: To identify the frequency of ABO blood group and RH factors distribution on voluntary blood donor at Debre Tabor blood bank from May 2014 to May 2020.

Methods: A retrospective cross-sectional survey was conducted to identify the frequency of ABO and Rh factor distribution on voluntary blood donors at Debre Tabor town blood bank. The data was collected at Debre Tabor blood bank. A six-year data and a total of 19,901 bags collected blood samples were used for summarization of the data. The data was analysed by using SPSS version 21.

Results: Blood group "O" was the dominated one with 39.6% followed by blood group "A", "B" and "AB" with 29.48%, 24.06%, and 6.7%, respectively. When we see the RH classifications, RH positive accounts the highest percentage 92.77% and the remaining 7.23% was Rh negatives.

Conclusion: In this survey, the majority of blood groups were found "O" followed by "A", "B", and "AB". Among the collected blood unities, 92.77% was RH positive. The leading blood donors were male.

Keywords: blood group, rhesus factor, blood bank, Debre Tabor

Introduction

Blood can be categorized into four blood groups (A, B, AB, and O) based on their surface antigen. Besides the above classification blood can be classified based on the rhesus factor as RH positive and RH negative. Blood group "A" contains antigen A on their surface red blood cell (RBC), blood group "B" has antigen B on their surface RBC, blood group "AB" has both antigens whereas, blood group "O" has neither of the two antigens. So, the blood will be donated based on the receiver and donor blood group. RH and other factors also considered before delivery of one blood to the other individual.

Blood groups vary based on the ethnic difference of the community. Among Chinese ethnic groups; the Yi group had more Blood group "A", Manchu and Mongolian ethnic groups had more "B" Blood groups, the Zhuang group had the

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highest proportion of “O” Blood group and “AB” Blood group were more frequent in the Uygur ethnic group.¹ A study done in Indian showed that blood group “B” was the most dominant one with 32.07% and Blood group “AB” was the rarest one with 10.53% and the remaining blood group “A” and “O” had equal frequency among the study populations.² A study done in Greece among medical students and showed that blood group “A” was the dominant one followed by “O”, “B” and “AB”, respectively, in decreasing order.³ Blood group distribution in Uganda showed that blood group “O” was found in 50.3%, blood group “A” in 24.6%, blood group “B” was 20.7% and blood group “AB” was 4.5% and the proportions of Rhesus positive and Rhesus negative were 98 and 2% respectively.⁴ One study was done in Ethiopia on three ethnic groups (sodo, Silte, and Meskan) revealed that blood group “O” was the dominant one and followed by “A”, “B” and “AB” in decreasing order, respectively, furthermore, “A” negative predominant in the case of Sodo but “O” negative in the case of others.⁵ A study was done at Gambella, Ethiopia found that blood type “A” was the most frequent (44.07%) among non-native individuals, while Nilotic natives Gambellas’ had “O” blood type (50.42%).⁶ Knowing the pattern of blood group and RH factor distribution in the blood bank is vital for further planning and stocking of blood. Blood at Debre Tabor center was mainly collected from the Debre Tabor town and the neighbor woredas. The voluntary blood donors were recruited by motivational speech and empathetic messages.⁷ The majority of volunteer blood donation was from the Debre Tabor University community including students (annual report of the blood bank). The voluntary blood donors at the study area were recruited through media, focused group discussion, and by forming a voluntary blood donors club at the site of collection. This study aimed to identify the frequency of ABO blood group and RH factors distribution on voluntary blood donor at Debre Tabor Blood bank since till now there was no any study in the blood bank on ABO and RH frequency distribution.

Methods

A retrospective cross-sectional survey was conducted to Identify the frequency of ABO blood group and Rh factor distribution of blood donors at Debre Tabor town blood bank. Debre Tabor is a town in North-Central Ethiopia, found 667 km away from the capital city of Ethiopia (Addis Ababa), 100 kilometers Southeast of Gondar, and

50 kilometers East of Lake Tana. This town has an altitude and longitude of 11°51'N38°1'ED with an elevation of 2706 meters (8878ft) above sea level. Based on the population growth projection the current total population of the zone is about 2,578,906. Debre Tabor blood bank was established in May 2014. Currently, the blood bank provides blood for all hospitals in the South Gondar zone and some parts of the South Wollo zone. Furthermore, the blood bank also serves neighboring blood banks (Gondar, Bahir Dar, and Dessie blood bank) when there is high stock on the blood bank. The blood was collected through the campaign at the blood bank, at hospitals, and other health institutions and transported to the blood bank by keeping the cold chain. The blood withdraws from the donors and samples taken for blood grouping. The blood grouping was done through an open slide test method and by adding a drop of each antisera from Atlas Medical-Jordan (AntiA, AntiB, and Anti D) on the prepared sample on each slide and see the agglutination. Consent was waived by Debre Tabor University ethical review committee since we used secondary data. The data was collected after getting permission from the Debre Tabor blood bank. This study was complied with the declaration of Helsinki. We collect the data from the blood bank by the checklist and using the blood bank report and analysed using SPSS version 21for describing the result. A total of six-year blood bank data were used for analysis. We used only donator age, sex, the ABO blood group, and their residents (university and other catchments community) based on their code number given at the blood bank. Other than this we did not use other voluntary blood donors’ data like personal identification. All data were secured, protected, and accessed only for the authors. The descriptive data were summarized by text, tables, and figure.

Result

In this survey the majority of collected blood was from male individuals at the blood bank (67.8%), and adults the age of 18–24 account the major blood donors (Table 1).

In this survey, we got a total of 19,901 bags of collected blood within six years. The number of collected blood units increases with the years (Figure 1).

Blood group “O” was the dominated one with 39.6% and blood group AB with 6.7% was the least one and when we see the RH classifications RH positive accounts the highest percentage 92.77% and the remaining 7.23 accounts Rh negatives (Table 2).

Table 1 Age and Sex Distribution of Voluntarily Collected Blood Units from May 2014 to May 2020 at Debre Tabor Blood Bank

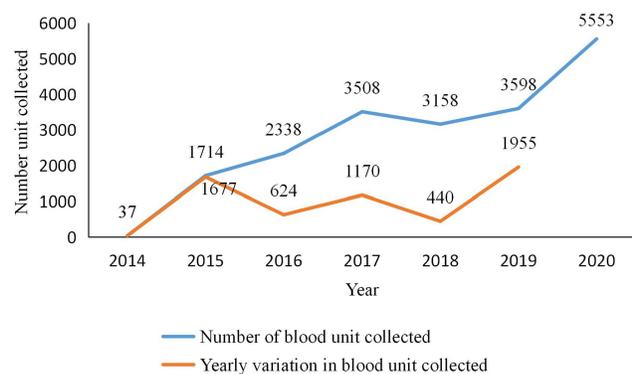
Age Range	Male	Female	Total	Percent (%)
18–24	7700	5648	13,348	67.1
25–29	2427	402	2829	14.2
30–34	1783	168	1951	9.8
35–39	831	75	906	4.5
40–44	412	75	487	2.4
45 and above	356	24	380	2.0
Total	13,509	6392	19,901	100
Percent (%)	67.8	32.2	100	

From the voluntarily collected blood, 80% was from University students and the remaining 20% was from other residents of the town and neighbor woredas.

Discussion

Grouping an individual's blood into the ABO (RH) system is vital before discussing blood therapy. Blood therapy is the mainstay of life, especially during surgical services. From this study, we found that blood group "O" was the most dominant and accounts 39.65% followed by blood groups "A", "B", and "AB" with 29.48%, 24.06% and 6.81%, respectively. This result is similar to studies that showed that blood group "O" was the dominant blood group and "AB" was the rarest blood group.^{8,9}

From this study, RH positive was the most prevalent and accounts with 92.77% and the remaining 7.23% was RH negative. Our findings related to the finding of Makro et al and they revealed that 92.7% of voluntary blood donors were RH positive and the remaining 7.3% of them were RH negative.¹⁰ Rhesus factors vary on different populations across the world and RH negative high in England (18%), Greece (11%), and low in Nigeria (6%)

**Figure 1** Trends of blood unit collected and yearly variation at Debre Tabor blood bank from May 2014 to May 2020.

and very low in Madagascar (1%).¹¹ And when we see on its ABO distribution still "O" positive was the dominant one with 36.59% and "AB" positive was the least one with 6.33%. Another study also in line with this result "O" positive was the dominant one and "AB" positive was the least.¹² But on the other hand, other studies showed a different result, and they revealed that "A" positive was the dominant one followed by "O" positive but "AB" positive was still the least one.¹³ On the other hand, Golassa et al showed that there is a blood group difference among ethnicities between Gambella (natives) and other residences (highlanders) and conclude that blood group "A" positive was the dominant one for highlanders and blood group "O" positive was the dominant one for natives.⁶ In our study from RH negative, the "O" negative was the most prevalent with 3.06% and "AB" negative was the rarest with 0.48%. This result related to Alemu et al works and they showed that blood group "O" the dominant and "AB" negative the least prevalent blood group.¹⁴ Regarding RH negative blood groups another study showed a different result which revealed that blood group "A" negative was the predominant one in Sodo ethnic group⁵ and "B" negative prevalent in India² but both studies showed "AB" negative was the least prevalent blood group.

From this survey, we found that 67.8% unit of collected blood was from males. Other studies also found that males were dominant for voluntary blood donation than females, their reason was females had low participation, motivation, and perception of the importance of blood donation.^{15,16} The most motivational factors for voluntary blood donations are moral duty and spiritual rewards whereas the barrier for blood donation was fear of anemia, lack of time, and difficulty of access the blood donation site which has an impact on female gender for voluntary blood donation.¹⁷

From our survey, 80% of the voluntary blood donors in the blood bank were university students who had good information that increased their knowledge, attitude, and practice towards voluntary blood donation. Other studies also related to this study, getting information about blood donation, being a health professional and health science student, the experience of blood receivers from their family or relatives and even experience of blood donation had increased knowledge, attitude, and practice for voluntary blood donation.^{18–20}

Most blood donors (67.1%) from the blood bank were within the age group of 18–24 years old. Another

Table 2 ABO and RH Distribution of Voluntarily Blood Donators from May 2014 to May 2020 at Debre Tabor Blood Bank

ABO Blood Group	Rhesus Factor (RH)		Total Number (Percent)
	RH +	RH-	
A	5413 (27.19)	457 (2.29)	5870 (29.48)
B	4509 (22.66)	279 (1.4)	4788 (24.06)
AB	1258 (6.33)	95 (0.48)	1353 (6.81)
O	7282 (36.59)	608 (3.06)	7890 (39.65)
Total Number (percent)	18,462 (92.6)	1439 (7.4)	19,901 (100)

study also agrees with our result younger age was the most blood donors and younger were more informative and motivated for the donation than the elders.²¹ But other studies showed that older and repeated blood donor were associated with voluntary blood donation.^{22,23} Since from this work, the majority of blood donors were university students with younger age groups and the fact that the practice of blood donation from the community was low.²⁴ Therefore community awareness creation and mobilization recommended to increase their practice of voluntary blood donation.

Conclusion

In this survey, the majority of blood groups were “O” followed by A, B, and AB. From the collected blood, 92.77% was RH positive. The male gender was the dominant voluntary blood donors.

Limitation of the Study

This data was taken from single blood bank data and we used only secondary data. The other limitation of this work was, we did not get the new donors with the repeat donors from the paper-based source.

Abbreviations

ABO, blood group A, blood group B, blood group AB and blood group O; E.C, Ethiopian calendar; RBC, red blood cells; RH, rhesus factor; WHO, World Health Organization.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published. All Authors have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors confirmed that there is no conflict of interest.

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