



Investigation on the distribution of ABO and Rh Blood Groups in the population of Allinagaram village, Srikakulam District

Sujatha Peela and Swethalatha Porana

Department of Biotechnology, Dr B. R. Ambedkar University, Srikakulam, Andhra Pradesh, India

ABSTRACT

Allinagaram is one of the small village which belongs to the Etcherla Mandal, Srikakulam District of Andhra Pradesh State. The village is located adjacent to NH-16 Chennai –Kolkata National Highway. As the chances of road accidents were more in the village due to its geographical distribution near NH-16 we have conducted a survey on the blood group awareness in the village. In the survey we found 95% of the village population do not have blood group awareness which is a pre requisite in road accidents. Further as the distribution of blood groups and their frequencies exhibit considerable variation in different geographic locations, reflecting the underlying genetic and ethnic diversity of human population we conducted a study to evaluate the Distribution of ABO and Rh (Rhesus) D blood groups in the population of Allinagaram village randomly. A survey was conducted to investigate the frequency of different blood groups in Allinagaram village. The Blood group phenotypes were detected using Classic Slide method ABO and Rh Blood groups. A total of 508 individuals were randomly selected for the evaluation of blood grouping in this survey. The study evaluated the frequency of blood groups were found to be A- 17.91%, AB-6.88%, B- 29.52% and O-45.66% respectively. Out of 508 individuals, only 5.31% were found to be Rh negative.

Key words: Blood group, Random, Phenotype

INTRODUCTION

Srikakulam is geographically extreme North Eastern district of Andhra Pradesh State, formerly known as Chicacole, It was formed by bifurcating it from Visakhapatnam district in the year 1950. Allinagaram village is located 9 km, towards west from district headquarters of Srikakulam. The village is distributed in the Etcherla Mandal of Srikakulam district. The village is located adjacent to NH-16 Chennai –Kolkata National Highway.

Blood is a specialized connective tissue with complete and unchangeable identity although almost 400 blood grouping antigens have been reported. In this ABO and Rh is recognized as the major clinically significant blood group antigens, which are also known to vary from one population to another. Karl Landsteiner was the first person to put forward the ABO blood group system in 1900. Since 1901 more than 20 distinct blood groups systems have been characterized but the ABO and Rhesus (Rh) blood groups remain the most clinically important. Both these systems are useful in blood transfusion and organ transplantations. They are also well defined genetic and anthropological studies [1,2]. The distribution of these two blood groups has been repeatedly investigated in various populations all over the world during the last half century. The frequencies exhibit considerable variation in different geographic locations, reflecting the underlying genetic and ethnic diversity of human population. [3].

Every individual has two types of blood groups the first is called ABO and second type is called Rh grouping. The ABO and Rh is recognized the major clinically significant blood group antigens. It is most important blood group system regarding human blood transfusion list of this associated with anti A and antiB antibodies, are usually immunoglobulins. These antibodies are produced in the first few years of life to be sensitization to a variety of foods, bacteria and viruses. Determination of ABO blood groups to avoid transfusion reaction and death [4]Also, the presence of Rhesus blood group was recognized in 1939 and it was confirmed within few years [5,6] With the ABO blood group individuals are divided into four major blood groups namely, A, B, AB and O, according to the presence of antigens and agglutinins. Group A blood has type A antigens, group B blood has type B antigens and group O blood has neither A nor B antigens. Also plasma from blood group A contains Anti-B antibodies which act against type B antigens, whereas plasma from type B blood contains Anti-A antibodies, which act against type A antigens. Type AB has neither type of antibody and type O blood has both A and B antibodies

The Rh blood group system is the second important blood group system for human blood transfusion. In the Rh group either individual is Rh positive or Rh negative. Rh is a factor called Rhesus factor that has come to us from Rhesus monkey. Rh is refer to the protein on blood cell (protein present: Rh+ve; protein absent- Rh-ve) thus, each and every human being will fall in one of the following groups, A+ve or A-ve, B+ve or B-ve, AB+ve or AB-ve , or O+ve or O-ve

The objective of the present study is to evaluate the frequency of ABO and Rh blood groups in Allinagaram village population of Srikakulam District, which is an important geographical distributed area in the state of Andhra Pradesh with many significances.

EXPERIMENTAL SECTION

AntiA, AntiB, and AntiD monoclonal antibodies from TULIP Diagnostic Private Limited for Blood typing

A survey was conducted initially in the Allinagaram village about the Geographical distribution, Socioeconomic Status, and literacy rate in the population present in the village. Further based upon the survey results we have started our ABO and Rh blood typing of the individuals using the slide method randomly. A drop of blood was collected from individuals aseptically and placed on spirit cleaned dry glass slide in three circles. To each circle anti A, and anti B and anti D were added respectively. The sera were mixed with applicative sticks. And observed after one minute for agglutination reaction.

RESULTS AND DISCUSSION

The survey conducted in Allinagaram village about the geographical distribution were represented in Table 1. As shown in Table 1 there are 4 colonies present in the village geographically. Among the 4 colonies more number of houses were present in Gollaveedhi(379) and lowest in SC colony (25). There are 1035 males and 984 females were present in all the 4 colonies of Allinagaram village.

As we have also carried out a survey about literacy rate of the population in Allinagaram village. The Socio economic status and literacy rate were represented in Table-2. The literacy rate in males is 56.23% and in females 51.42%.As shown in Table2 among the 4 colonies, Gollaveedhi having highest percentage of literacy rate (17%) whereas lowest in SC colony (5%) and the other colonies Raghunandapuram and Kamarajpeta literacy percentage is 15% and 13% respectively. During our survey we found the economic status of the Gollaveedi is better compare to other colonies.

During our investigation on the Blood group distribution and frequency in the Allinagaram village population we found all different groups among the population and the results were represented in Table 3. As shown in Table 3, a total of 508 people were randomly selected from Allinagaram village in all the colonies and among these 245 were males and 263 are females. Out of 245 males the highest no of individuals having blood group O and the lowest no of individuals having the AB blood group. We also found same kind of distribution in females also.

The sex wise distribution of ABO blood group in the population of Allinagaram were represented in Table 4. As shown in Table 4 among all the individuals 23.81% females and 21.85% males having 'O' group this is the highest percentage of the individuals and 3.54%femalesand 3.34%males having AB group (Figure 1).

The sex wise distribution of Rh blood group in Allinagaram population were represented in Table 5. As shown in the table 48.22% of the female population and 46.65% male population having Rh positive and 3.54% females and 1.57% male population having Rh negative blood group distribution (Figure 2).

The correlation between Rh and ABO blood groups of individuals in the Allinagaram village were represented in Table 6. As showing Table6, 94.68%individualshaving Rh positive and only 5.3%individuals having Rh negative blood typing. Among Rh positive individuals, the highest number of individuals having O group (43.50%), and lowest having AB group (6.69%). On the other hand Rh negative individuals also showed similar kind of distribution of O and AB blood groups (Figure 3).

From our study, the distribution of blood group O was highest with percentage frequency of 45.66% followed by blood group B, 29.52% and A with 17.91% respectively and the least percentage frequency is that of blood group AB which is 6.88% (Figure 4).

Normally, the distribution of ABO blood group varies from one population to another. In many other studies, blood group O has been found to be the most common blood group .In the Nepalese people the study conducted among 120 Nepalese medical students of Nepal medical college, Jorpati ,Katmandu has found that 34% are blood group A, 29% group B, 4% group AB and 32.5% group O. The frequency of Rh negative blood were 3.33% and Rh positive 96.66% [7] the Caucasians in the United states ,the distribution of group O, 47%,group A,41%,group B,9% and group AB, 3%[8]Among western Europeans 42% are group A,9% group B,3% group AB and the remaining 46% group O, For blacks in United states, the distribution is group O,46%,group A,27% group B,2% and group AB ,7% Similarly, in Pakistan[9,10] ,blood group O is the most common(35%),blood group A is 24%., blood group B is 33% and group AB is 8%.In Lagos Nigeria blood group O is 55.3%,blood group A, 25.3%,blood group B,16.7% and blood group AB ,2.7%[11] Thus, the segregation of the genes are responsible for the ABO blood groups has always taken a particular pattern for its distribution. In this study, it can be seen that blood group AB has the least percentage, which is most of the time very rare and also the case in other previous studies.

Table1: Geographical distribution of Allinagaram village population

Name of the Colony	Total no of Houses	Total Population	Male	Female
Gollaveedhi	379	1490	774	716
SC Colony	25	103	54	49
Raghunadhapuram	119	234	122	112
Kamarajupeta	35	192	85	107
Total	558	2019	1035	984

Table 2: Socio economic status of the Allingaram Village population

Name of the Colony	Economic status (%)	Literacy rate (%)
Gollaveedhi	***(4) **(25) *(72)	17
SC colony	*** (1) **(12) *(87)	5
Raghunadhapuram	***(2) **(29) *(69)	15
Kamarajupeta	***(2) **(30) *(68)	13

*-Poor;**-Middle class; ***-Upper Class

Rh blood group distribution also varies within any group of human population to others.in this study. It was observed that O blood group with Rh positive is the highest with a percentage frequency of 43.50% which is followed by group B , Rh positive with the percentage frequency of 28.14%. Blood group A with Rh positive is 16.33% and AB with Rh positive is 6.69%.This study showed a total percentage of Rh positive distribution is 94.88% and Rh negative distribution is 5.11%. Similar pattern of distribution was observed in Nepal study .In Nepal the total percentage of Rh positive distribution is 98.6% and Rh negative distribution is 1.4%. It was also

observed in other studies same type of distribution. Rh negative blood group is documented as 5.5% in South India, 5% in Nairobi Kenya, 4.5% in Nigeria, 7.5% in Lahore, 7.7% in Rawalpindi students[12,13,14,15].

Table 3: Distribution of ABO Blood Group among the Individuals of Allinagaram village

S. No	Type of Blood Group	No of Individuals	
		Male	Female
1.	A	36	55
2.	B	81	69
3.	AB	17	18
4.	O	111	113
5.	TOTAL	245	263

Table 4: Sexwise distribution of ABO blood group among the individuals of Allinagaram village

ABO	COUNT	SEX		TOTAL
		FEMALE	MALE	
A	Count	55	36	91
	% within the sex	20.91%	14.69%	17.91%
	% of total	10.82%	7.086%	17.91%
AB	Count	18	17	35
	% within the sex	6.84%	6.93%	6.88%
	% of total	3.54%	3.34%	6.88%
B	Count	69	81	150
	% within the sex	26.23%	33.06%	29.52%
	% of total	13.58%	15.94%	29.52%
O	Count	121	111	232
	% within the sex	46.00%	45.30%	45.66%
	% of total	23.81%	21.85%	45.66%
TOTAL	Count	263	245	508
	% of total	51.77%	48.22%	100%

Table 5: Sexwise distribution of Rh blood group in Allinagaram village

Sex	Count	Rh Group		Total
		Negative	Positive	
Female	Count	18	245	263
	% within the sex	69.2%	50.82%	51.77%
	% of total	3.54%	48.22%	51.77%
Male	Count	8	237	245
	% within the sex	30.76%	49.17%	48.22%
	% of total	1.57%	46.65%	48.22%
Total	Count	26	482	508
	% of total	5.11%	94.88%	100%

Table 6: Correlation between Rh and ABO blood groups of individuals of Allinagaram village

ABO	COUNT	Rh GROUP		TOTAL
		NEGATIVE	POSITIVE	
A	Count	8	83	91
	% within the sex	29.62%	17.25%	17.91%
	% of total	1.57%	16.33%	17.91%
AB	Count	1	34	35
	% within the sex	3.70%	7.06%	6.88%
	% of total	0.19%	6.69%	6.88%
B	Count	7	143	150
	% within the sex	25.92%	29.72%	29.52%
	% of total	1.37%	28.14%	29.52%
O	Count	11	221	232
	% within the sex	40.74%	45.94%	45.66%
	% of total	2.16%	43.50%	45.66%
TOTAL	Count	27	481	508
	% of total	5.31%	94.68%	100%

Figure 1: Distribution of ABO Blood Group among the Individuals

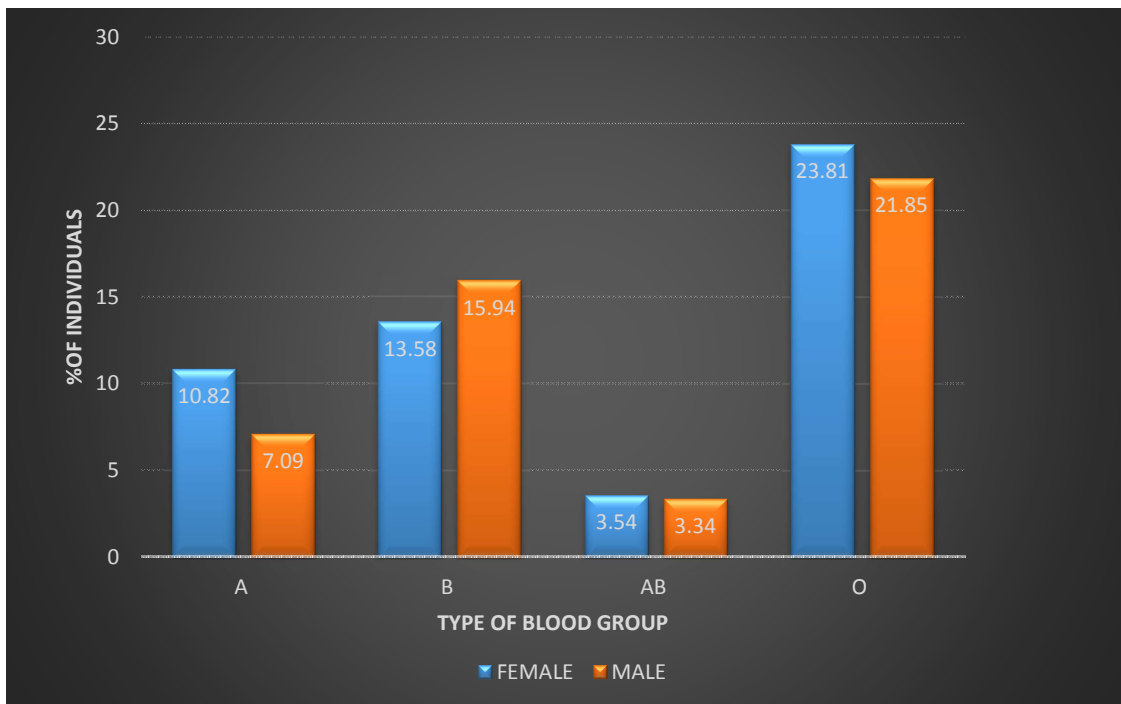


Figure 2: Sex wise distribution of Rh blood group

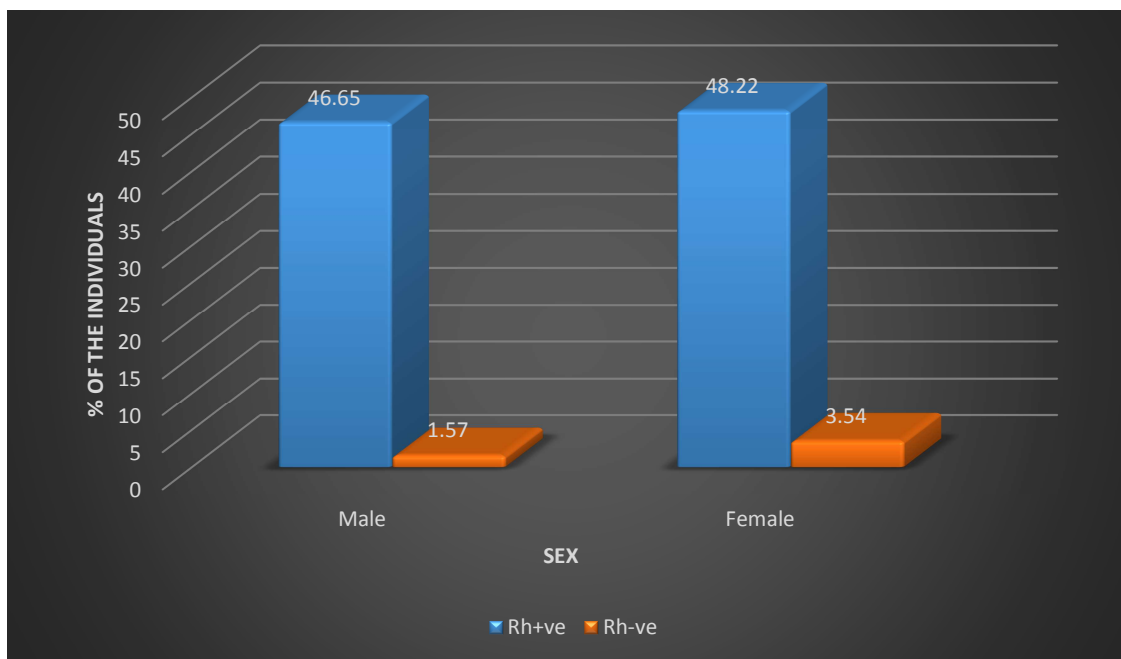


Figure 3: Correlation between Rh and ABO blood groups of individuals

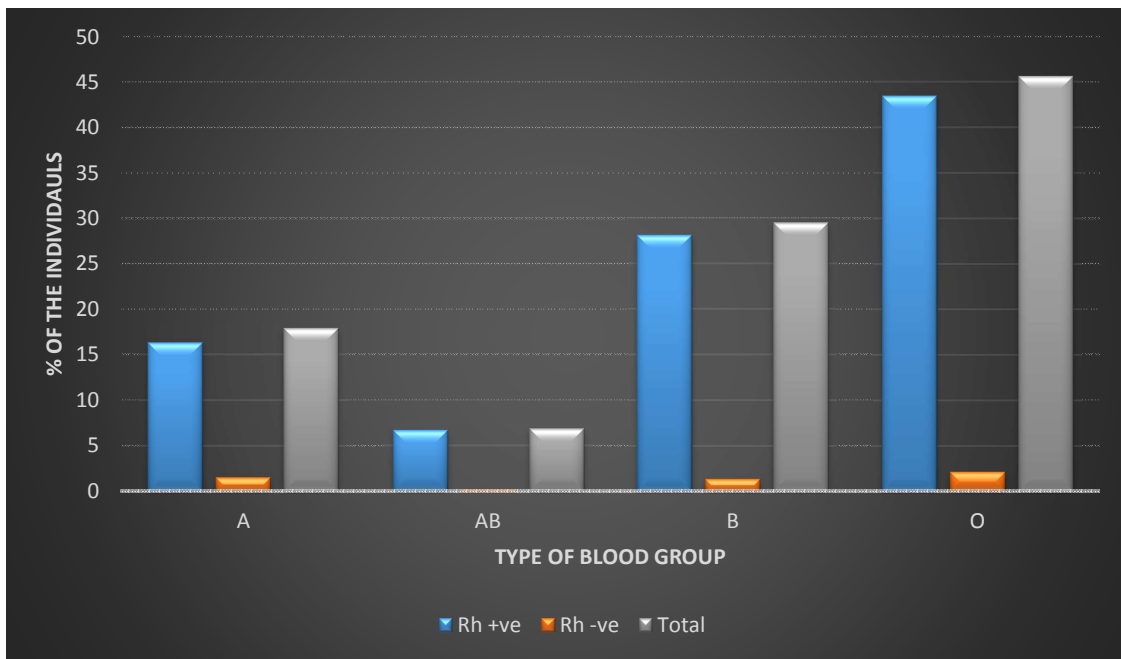
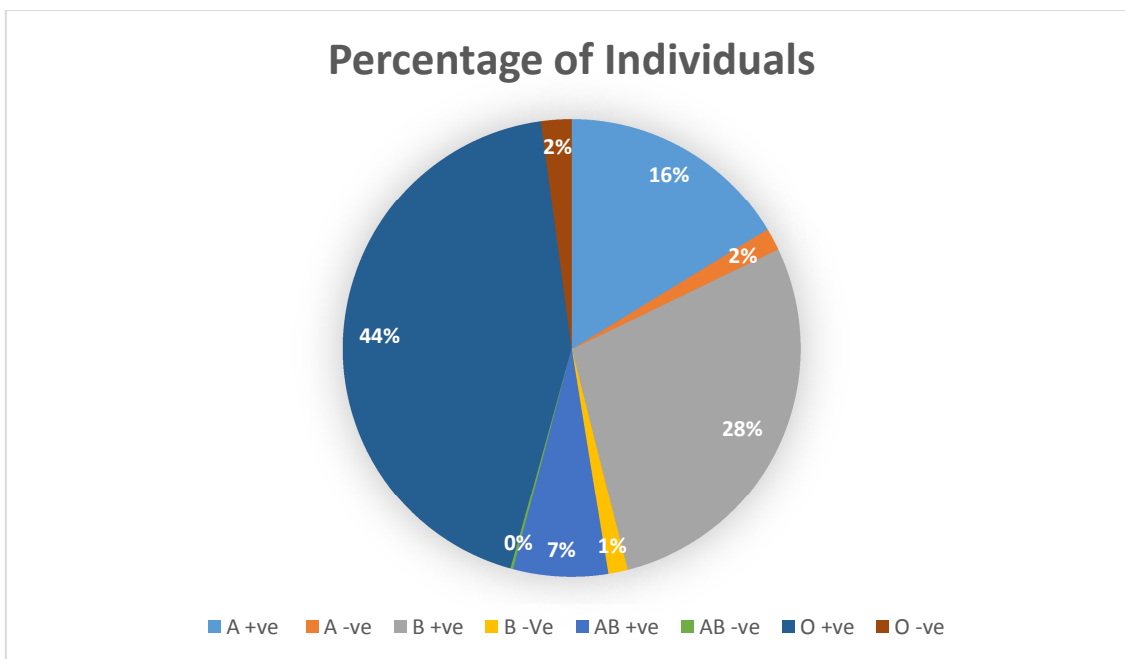


Figure 4: Distribution of ABO and Rh blood groups among the individuals



CONCLUSION

The frequency of ABO and Rh blood groups appeared to be stable and consistent in different population of the world. Blood Group O was the most prevalent, this also mean there is a large pool of universal blood donor in this Population.

As the literacy rate is low in Allinagaram compared to many other villages of Srikakulam district, awareness of blood groups will be greatly useful for blood transfusion during the time of accidents. Further the knowledge of the distribution of ABO and Rh blood groups concentration in any population is useful in health care planning, medical diagnosis, if such information is well managed it can make a difference in the quality of decisions that individuals will make especially as it concerns marriage, blood transfusion and other medical demands. The data can also be utilized for future clinical, epidemiological and anthropological studies.

Acknowledgements

The authors acknowledge Department of Biotechnology, Dr. B. R. Ambedkar University, Srikakulam for financial support. The authors also acknowledge the staff and students support in completing this study. The authors also acknowledge the Allinagaram village people for their support in carrying out this research study.

REFERENCES

- [1] Amin-ud-Din M et al. Serological study among the municipal employees of Tehran, Iran. **2004**, 7(4),502–4.
- [2] JMSigmon. *Journal of clinical apheresis*.**1992**, 7(3),158–62
- [3]LL Cavalli-Sforza; P Menozzi;A Piazza. The history and geography of human genes. Princeton, New Jersey, Princeton University Press, **1994**.
- [4] CLHonig Bore. *JR Transfusion associated fatalities*. **1994**,20,653 –661.
- [5] KLandsteiner; P Levine. *pro s oc EXP boil*.**1927**, 24,941
- [6] KLandsteiner ; AS wiener.*JEXPmed*.**1941**,74, 309.
- [7] JTPramanik ; S Pramanik..*Eastern Mediterranean Health J*.**2000**,6(1),156-158.
- [8] RRSeeley;TDStephens;PTate. *Anatomy and Physiology* .4edition.The McGraw Hill Companies, Inc. USA, **1998**, 1098
- [9] ANanu; RMThapliyal. *Indian J Med Res*._**1997**,106,242–6.
- [10] MAfzal; Ziaur-Rehman; F Hussain;R.A Siddiqi *J Pak Med Assoc*.**1977**,27,426–8.
- [11] OA Adeyemo; JO Soboye; B Omolade. *Afri. J. Biotech*. **2006**, 5, 2062- 2065.
- [12]MN Khan; IKhaliq; A Bakhsh ; MS Akhtar; M Amin-ud-Din*Eastern Medit. Hlth. J*. **2009**, 15(3), 717 -721.
- [13] J Mawuagi*East Afr. Med. J*.**1999**, 76(11),615 -618.
- [14] OOmotade ; A Adeyemo ;CM Kayode; SL Falade; S Ikpeme. *West Afr. J. Med*.**1999**, 18,294-297.
- [15] FA Bhatti; M Amin *journal of pathology*, **1996**, 7(2),26–8.