



VISION AND BLOOD GROUPING: A POSSIBLE LINK.

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ABSTRACT

BACKGROUND: The ABO blood group was discovered in 1900 century by Austrian, Karl Landsteiner. Since then, the importance of blood typing could not be denied because of its possible association with different physiological and pathological conditions of individuals; hence ABO/Rh blood is linked with various genetic, metabolic, and pathological conditions. **OBJECTIVE:** After the discovery of ABO blood group, the escalating importance of blood grouping cannot be denied in transfusion/ blood banking, Furthermore, recent research studies revealed that blood group is also associated with many pathologies. The aim of the studies, hence, is to find out the possible link between visual acuity and blood grouping. **METHODS:** A cross sectional (survey based) work was conducted with the sample size (n) of 424 (male and female). Blood grouping was performed and different charts (Snellen, Tumbling E and Jager) were used to find out the visual acuity. Total 848 eyes were monitored. **RESULTS:** According to Snellen's chart the highest percentage of abnormal eyes were found in O blood groups (in male) 44(10.18%) and 79(19.0%) in B blood groups in female. 120(27.78%) males and 199(47.84%) females were Rh+ with abnormal vision. According to Tumbling E chart, the highest percentage of abnormal eyes were found in O blood groups (in male) 50(11.57%) and 80(19.23%) in B blood groups in female. 127(29.40%) males and 206(49.52%) females were Rh+ with abnormal vision. According to Jager chart, the highest percentage of abnormal eyes were found in B blood groups (in male) 27(6.25%) and 37(8.89%) in female. 69(15.97%) males and 96(23.08%) females were Rh+ with abnormal vision. **CONCLUSION:** abnormal vision (far vision) is apparently more in o blood group in male and B blood group in female and B was associated with near vision in both male and female.

KEY WORDS: Blood group, Visual acuity, Snellen's chart Tumbling E chart, Jager chart.

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INTRODUCTION

The ABO blood group was discovered in 1900 century by Austrian, Karl Landsteiner. Since then, the importance of blood typing

could not be denied because of its possible association with different physiological and pathological conditions of individuals; hence

ABO/Rh blood is linked with various genetic, metabolic, and pathological conditions. Diabetes mellitus is strongly associated with Rh blood group¹. Recently it is linked with COVID-19 susceptibility², Epidemiological evidences suggest that female with blood group A is more sensitive to COVID-19 infection¹. Individual with O blood groups have more chances of Helicobacter Pylori infections³. The individual with O blood have more risk of Chronic periodontitis followed by A, B and AB blood groups⁴

Interestingly, An attempt was made to correlate the capacity of consuming water with blood grouping, according to a study, Those male who have O+ blood consume (drink) more water than others⁵. The individual with O and Rh positive are associated with increased risk of Hepatitis B infection⁶ while blood group B has least risk of infection⁷ and even the links between Alopecia areata (AA) and different blood groups were attempted to establish⁸. However No any recent study was found indicating the association between visual acuity and blood typing.

The current study was based on visual acuity with ABO blood group by using three different methods Snellen chart, tumbling "E" chart and jaegers chart⁹⁻¹¹. Hence the aim of the study was to explore the comparison and association of ABO and Rhesus blood grouping with visual acuity by using three different charts.

METHODOLOGY

RESULTS

Table. 1: The percentages of ABO blood groups in normal / abnormal vision in male and female using Snellen chart.

Sex	Blood group	Normal	Abnormal	Total	X ²	p-value
Male	A	61(14.12%)	35(8.10%)	96(22.22%)	4.027	0.25
	B	110(25.46%)	38(8.80%)	148(34.26%)		
	AB	14(3.24%)	06(1.38%)	20(4.63%)		
	O	124(28.70%)	44(10.18%)	168(38.89%)		
	Total	309(71.53%)	123(28.47%)	432(100%)		
Female	A	60(14.43%)	40(9.61%)	100(24.04%)	6.510	0.089
	B	67(16.10%)	79(19.0%)	146(35.0%)		
	AB	25(6.00%)	33(7.93%)	58(13.95%)		
	O	52(12.5%)	60(14.4%)	112(26.92%)		
	Total	204(49.03%)	212(50.97%)	416(100%)		

A cross sectional (Survey based) work was carried out from July 2021 to November 2021(05 months). The sample was collected through a random sampling method from the University of Sindh, Jamshoro, Pakistan. The study group comprised of male as well as female aging between 18-26 years. The sample size (n) was 424 (216 male and 208 female) thus 848(432 male and 416 female) eyes were investigated. Furthermore, the participants who were suffering from any eye disease infection or injuries were not included in the study.

For visual acuity, three different charts were used. Snellen chart was used and log MAR was calculated¹². Tumbling E (in which E was facing in different direction) were also used for visual acuity test¹³. The third method for near vision was jaeger test in which 1 (shortest font) to 11 (biggest fonts) were used from 14 inches distance¹³.

Rhesus and ABO blood grouping were performed by antigen/antibody reaction (Agglutination reaction) test by using standard antisera D, Anti sera A and anti sera B (Rapid Labs UK). The blood grouping was performed twice with the same sample in order to maximize accuracy and minimize error¹⁴.

Data are shown in percentages; n indicates the number of male and/or female investigated. P values were taken by calculating fisher's exact and chi square test. Odds ratio, likelihood ratio, sensitivity and specificity were calculated. GraphPad Prism 5 was used to analyse data.

Table. 2: Rhesus (Rh) blood groups of normal versus abnormal vision in male and female using Snellen chart.

Sex	Blood group	Normal	Abnormal	Total	p-value	Odds ratio	Likelihood ratio	Sensitiv & Specificity
Male	Rh(+)	280(64.81%)	120(27.78%)	400(92.59%)	.22	0.53	0.96	0.91 & 0.04
	Rh(-)	26(6.01%)	06(1.39%)	32(7.41%)				
	Total	306(70.83%)	126(29.17%)	432(100%)				
Female	Rh(+)	189(45.43%)	199(47.84%)	388(93.27%)	0.43	0.71	0.97	0.92 & 0.97
	Rh(-)	16(3.85%)	12(2.88%)	28(6.73%)				
	Total	205(49.28%)	211(50.72%)	416(100%)				

As shown in Table.1 and 2, the highest percentage of abnormal eyes were found in O blood groups (in male) 44(10.18%) and 79(19.0%) in B blood groups in female. 120(27.78%) males and 199(47.84%) females were Rh+ with abnormal vision when visual acuity was monitored with Snellen’s chart.

Table. 3: The percentages of ABO blood groups in normal/ abnormal vision in male and female using Tumbling chart.

Sex	Blood group	Normal	Abnormal	Total	X ²	p-value
Male	A	60(13.88%)	36(8.33%)	96(22.22%)	42.47	0.0001
	B	107(24.76 %)	41(9.50%)	148(34.26%)		
	AB	13(3.00%)	07(1.62%)	20(4.64%)		
	O	118(27.31%)	50(11.57%)	168(38.88%)		
	Total	298(68.98%)	134(31.02%)	432(100%)		
Female	A	53(12.74%)	47(11.30%)	100(24.04%)	2.199	0.53
	B	66(15.86%)	80(19.23%)	146(35.10%)		
	AB	26(6.25%)	32(7.70%)	58(13.94%)		
	O	49(11.77%)	63(15.14%)	112(26.92%)		
	Total	194(46.64%)	222(53.36%)	416(100%)		

Table. 4: Rhesus (Rh) blood groups of normal versus abnormal vision in male and female using Tumbling chart.

Sex	Blood group	Normal	Abnormal	Total	p-value	Odds ratio	Likelihood ratio	Sensitiv & Specificity
Male	Rh(+)	273(63.19%)	127(29.40%)	400(92.59%)	0.32	0.60	0.96	0.91&0.05
	Rh(-)	25(5.79%)	07(1.62%)	32(7.41%)				
	Total	298(68.98%)	134(31.02%)	432(100%)				
Female	Rh(+)	182(43.75%)	206(49.52%)	388(93.27%)	1.00	1.01	1.001	0.93 & .06
	Rh(-)	13(3.13%)	15(3.60%)	28(6.73%)				
	Total	195(46.88%)	221(53.12%)	416(100%)				

As shown in Table.3 and 4, the highest percentage of abnormal eyes were found in O blood groups (in male) 50(11.57%) and 80(19.23%) in B blood groups in female. 127(29.40%) males and 206(49.52%) females were Rh+ with abnormal vision when visual acuity was measured with Tumbling E chart.

Table. 5: The percentages of ABO blood groups in normal/abnormal vision in male and female using Jager chart.

Sex	Blood group	Normal	Abnormal	Total	X ²	p-value
Male	A	75(17.36%)	21(4.86%)	96(22.22%)	2.151	0.54
	B	121(28.0%)	27(6.25%)	148(34.25%)		
	AB	16(3.70%)	04(0.92%)	20(4.69%)		
	O	143(33.1%)	25(5.79%)	168(38.88%)		
	Total	355(82.17%)	77(17.83%)	432(100%)		
Female	A	73(17.54%)	27(6.49%)	100(24.03%)	4.402	0.22
	B	109(26.20%)	37(8.89%)	146(35.09%)		
	AB	40(9.61%)	18(4.32%)	58(13.95%)		
	O	92(22.11%)	20(4.80%)	112(26.93%)		
	Total	314(75.48%)	102(24.52%)	416(100%)		

Table. 6: Rhesus (Rh) blood groups of normal versus abnormal vision in male and female using Jager chart.

Sex	Blood group	Normal	Abnormal	Total	p-value	OR	Likelihood ratio	Sensitiv& Specificity
Male	Rh(+)	331(76.62%)	69(15.97%)	400(92.59%)	0.33	1.59	1.04	0.93&0.10
	Rh(-)	24(5.55%)	08(1.85%)	32(7.41%)				
	Total	355(82.18%)	77(17.82%)	432 (100%)				
Female	Rh(+)	292((70.19%)	96(23.08%)	388(93.27%)	0.81	0.82	0.98	0.92&0.05
	Rh(-)	22(5.29%)	06(1.44%)	28(6.73%)				
	Total	314(75.48%)	102(24.52%)	416(100%)				

As shown in Table.5 and 6, the highest percentage of abnormal eyes were found in B blood groups 27(6.25%) in male and 37(8.89%) in female. 69(15.97%) males and 96(23.08%) females were Rh+ with abnormal vision according to Jager chart.

DISCUSSION

The Study reveals that, according to Snellen chart the highest percentage of abnormal eyes were found in O blood groups (in male) 44(10.18%) and 79(19.0%) in B blood groups in female. 120(27.78%) males and 199(47.84%) females were Rh+ with abnormal vision.

According to Tumbling E chart, the highest percentage of abnormal eyes were found in O blood groups (in male) 50(11.57%) and 80(19.23%) in B blood groups in female. 127(29.40%) males and 206(49.52%) females were Rh+ with abnormal vision.

According to Jager chart, the highest percentage of abnormal eyes were found in B blood groups (in male) 27(6.25%) and 37(8.89%) as well as in female. 69(15.97%) males and 96(23.08%) females were Rh+ with abnormal vision. The trend in blood grouping with abnormal eyes were O>B>A>AB in male and B>O>A>AB in female when monitored through Snellen's and Tumbling E charts. For near vision, Jigar chart indicated B>O>A>AB (male) and B>A>O>AB (female)

Blood grouping is associated with malaria. Patients with blood group A and Rh+ have high violability to severe malaria [15], According to another study carried out in Sudan , the most prevalent blood group in malarial patient is blood group A, furthermore it is more common in male patients as compared to female 16. The highest prevalence of Typhoid and paratyphoid infection was reported in blood group O while least proportion was in AB blood group in a survey of children 17, According to another study the blood group B is most prevalent (42.59%) in typhoid patients 18.

Different type of cancers are also linked with blood groups, Recently pancreatic cancer is associated with A blood groups in

Chinese population 19. Prostate cancer was found highest in blood group B (male) and those having O blood groups are at least risk of developing bladder cancer in female 20, Blood group O+ was is reported more prevalent in diabetic patients in Nigeria 21, on the contrary no association was found in between Rh/ABO blood typing and diabetes mellitus 22, 23.

The dengue fever is also linked with dengue fever, individual with AB blood groups are prone to dengue fever 24 while another study correlate dengue fever severity with O blood groups 25.

Blood grouping is recently linked with COVID- 19, Blood group O has a least risk of developing Covid-19 26, The data of Wuhan suggests that female with blood type A are susceptible to COVID-19 27.

Conclusively, blood grouping is linked with many metabolic/genetic disorder and infections; however, no concrete work is available in current literature indicating association of ABO/RH blood typing with vision. In current study, abnormal vision (far vision) is apparently more in O blood group in male and B blood group in female. And B was associated with near vision in both male and female.

CONCLUSION

Abnormal vision (far vision) is reported in O blood group (in male) and B blood group (in female). Blood group B was associated with near vision in both male and female.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

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