# ABO BLOOD GROUP AND HEARING LOSS; A CORELATIVE STUDY

**Syed Farhan Uddin[1], Kiran Waheed[2], Habib-ur-Rehman Chohan[1], Ahmed Hussain Suha[3], Syed Zain-ul-abdeen[4], Salma Mumtaz[2]**

**ABSTRACT**

**BACKGROUND:** Hearing is one of the most important especial sense which is used for communication with the external world. Disability to properly perceive sound leads to anxiety and depression due to poor communication in routine life. There are different causes of hearing loss which may lead to conductive, sensorineural and mixed hearing loss. Different researchers believe that blood groups have a strong association with hearing loss.

**OBJECTIVES:** The aim of this study was to investigate the relationship between blood group and hearing loss.

**METHODOLOGY:** This correlational was approved by the Department of Physiology in collaboration with the Department of ENT of Liaquat University Hospital Hyderabad from June 2023 –September 2023.The ethical latter No. Physiol/27 Dated:10/03/20.Total 596 participants were selected, 330 were male and 266 were female, who came in the ENT OPD with the complain of hearing impairment. Blood groups of patients were analyzed by blood agglutination method while the hearing threshold was determined by audiometer MAICO MA 39. Only sensorineural loss with auditory threshold more than 25 Decibel were included in the study.

**RESULTS:** The present study suggests that the persons who have the O blood group have more chances of suffering from hearing loss. The *P* value was 0.02 in male and 0.04 in females. The Rhesus positive group was 0.7 more involved in hearing loss than Rhesus negative (ODD ratio 0.7, Like hood ratio 0.9).

**CONCLUSION:**

The current study concludes that blood groups have a direct association with hearing loss and O blood group is more predominant in this context.

**KEY WORDS:**

Blood Groups, Hearing Loss, Pure tone audiometry, Rhesus grouping

**INTRODUCTION**

The blood is complex connective tissue consisting of cells and plasma, electrolytes, hormones and water.

1. Muhammad Medical College, Mirpurkhas, Pakistan
2. Indus Medical College, Tando Muhammad Khan, Pakistan
3. Mekran Medical College, Turbat, Pakistan
4. MBBS Student, Bilawal Medical College LUMHS Jamshoro, Pakistan

**Address for Correspondence**
**Dr. Kiran Waheed**
Assistant Professor , Department of Biochemistry, Indus Medical College, Tando Muhammad khan Pakistan
syedam4252@gmail.com
+92 320 3012681

The function of RBCs is to transport respiratory gases across the body.[1]Landsteiner was the first person who discovered the ABO blood group system. He discovered the blood group by agglutination method i.e. When one blood group is mixed with other blood group the RBCs of mismatched blood become clumped.[2]The further research discovered other blood group including Duffy, MNS, Dell and kidd group.[3]

Blood groups are because of specific carbohydrate moiety on the surface of RBCs. These carbohydrate moieties have the ability to bind the specific antigens. This make a person bearing a specific group susceptible to suffer from some specific disease.[4]These blood group antigens are also located on other areas of body e.g. platelets and endothelial cells of vessels wall.[5]

Human body has five especial senses including vision, hearing, smell taste and touch. Hearing is the perception of audionic waves and understanding its meaning. It is sense of communication to external world. Human perceive the sound in the hearing range of 20 Hz to 20,000 Hz. Any impairment in this range is called Hearing loss.[6]The hearing loss is of three types including conductive, sensorineural and mixed type. About 466 million peoples throughout the world are suffering from hearing loss and most of the patients are adults i.e. 432 million.[7]

Hearing loss leads to change of social life, depression, anger and anxiety.[8]Different researchers found association between blood groups and diseases of different systems including cardiovascular system, central nervous system and especial senses.[9]The association of hearing loss to blood groups was first discovered by Mollicone., *et al* who detected absence of A antigen on the primary cells in O blood group persons.[10]It was also discovered that specific blood groups make persons susceptible to noise induced hearing loss. [11]

Different researchers found that threshold of internal acoustic reflex was elevated in specific blood groups.[12]This is because of damage to internal hair cells in specific blood group. The most commonly found blood group involved in the hearing loss is O blood group.[13] Another possible mechanism is damage to the spiral ganglion.[14]genetics also determine the hearing loss in certain blood group patients because mutation produce damage otological structures.[15]

The current study endeavor to establish an association between blood groups and hearing loss.

**Problem Statement, Conceptual Framework, and Research Question**

The study examines the correlation between ABO blood group types and hearing loss. The primary variables considered include blood group types (A, B, AB, O) and the degree of hearing loss measured in decibels.

**OBJECTIVE:**

The objective of this study was to find any relationship between hearing loss and blood groups.

**Methodology:**

This correlational was approved by the Department of Physiology Sindh University Jamshoro. The setting of the study was in the Department of ENT of Liaquat University Hospital Hyderabad from June 2023 – September 2023.The university ethical latter no was No. Physiol/27 Dated:10/03/20. The sample size was calculated by Raosoft calculator. Five hundred and ninety six(n=596) patients were selected who came to the OPD of Otorhinolaryngology for examination with complain of decreased hearing threshold. There were 330 male and 266 female patients. Only patients between the age of 18 to 40 years of age group were selected. The blood groups of the participants were carried out by blood agglutination method on the glass slide. Only the patients were selected who were suffering from sensorineural hearing loss. The exclusion criteria were individuals with a history of ear infections, individuals who are on ototoxic drugs, individuals who had hearing loss as a result of trauma, and participants with any medical condition that affects the hearing, e.g. Hypertension and diabetes were all excluded from this study to ensure the accuracy of the results. The selection was done after clinical examination, tuning fork test and audiometric examination. A hearing threshold of more than 25 was considered as significant in both air and bone conduction audiometric evaluation.

After taking a detailed history about the hearing problems patients were extensively examined by otoscope, tuning fork tests and pure tone audiometry. The audiometer used was audiometer MAICO MA 39 (Made in Germany). Data was analyzed by Graph Pad Prism5. Frequency and comparison between groups was determined by descriptive statistics. Fisher' exact test and Chi-square test was applied to deduce *P* value, 0.05 and less was considered significant.

**RESULTS**

Table 1 examine the gender wise distribution of participants

**Table: 1,** Frequency of participants

| Variable | Frequency | Valid Percent |
|---|---|---|
| **Male** | 330 | 55.36% |
| **Female** | 266 | 44.64 |
| **Total** | 596 | 100 |

Table.2; Illustrate that O blood group is significantly (P value 0.02) associated with hearing loss. The O blood group in male patients has 12.08% association with hearing loss while A blood group has 7.55%, B blood group has 5.03%, AB blood group has 1.34% association.

In the female patients a similar association was noted between O blood group and hearing loss. The P value was 0.04 signifying the association.

**Table #2 Association of different Blood groups to Hearing Loss**

| Gender | Blood Group | Normal | Hearing loss | Total | *X2* | *d.f* | *p-VALUE* |
|---|---|---|---|---|---|---|---|
| **Male** | A | 55(9.22%) | 45(7.55%) | 100(16.77%) | 9.2 | 3 | 0.02 |
| | B | 40(6.71%) | 30(5.03%) | 70(11.74%) | | | |
| | AB | 22(3.69%) | 8(1.34%) | 30(5.03%) | | | |
| | O | 58(9.73%) | 72(12.08%) | 130(21.81%) | | | |
| | Total | 175(30%) | 155(26%) | 330(55.36%) | | | |
| **Female** | A | 40(6.71%) | 45(7.55%) | 85(14.26%) | 7.9 | 3 | 0.04 |
| | B | 25(4.19%) | 20(3.35%) | 45(7.55%) | | | |
| | AB | 18(3.02%) | 8(1.34%) | 26(4.36%) | | | |
| | O | 45(7.55%) | 65(10.90%) | 110(18.45%) | | | |
| | Total | 128(21.47%) | 138(23.15%) | 266(44.63%) | | | |

Table.3; Illustrate that in both male and female patients higher proportion of hearing loss occur in Rhesus positive group. The P value was 0.3 in male and 0.07 in female signifying that hearing loss can occur in both male and female patients. The Rhesus positive group has 0.7% more chances of having hearing loss (Odds ratio= 0.7, likelihood ratio= 0.9).

**Table #3 Association of Rhesus groups to Hearing loss.**

| Gender | Blood Group | Normal | Hearing Loss | Total | *P value* | *ODD Ratio* | *95%CI* | *Sensitivity/ specifity* | *Like hood ratio* |
|---|---|---|---|---|---|---|---|---|---|
| **Male** | Rh + | 140(23.48 %) | 130(21.81%) | 257(43.12 %) | 0.3 | 0.7 | 0.4 to 1.3 | 0.8/0.1 | 0.9 |
| | RH - | 35(5.87%) | 25(4.19%) | 73(12.24%) | | | | | |
| | Total | 175(29.36 %) | 155(26%) | 330(55.36 %) | | | | | |
| **female** | Rh + | 100(16.77 %) | 120(20.13%) | 220(36.91 %) | 0.077 | 0.5 | 0.2 to 1.0 | 0.7/0.1 | 0.8 |
| | Rh - | 28(4.69%) | 18(3.02%) | 46(7.71%) | | | | | |
| | Total | 128(21.47 %) | 138(23.15%) | 266(44.63 %) | | | | | |

## DISCUSSION

The blood group O is the most common blood group in the world, and it is characterized by the absence of A and B antigens on the red blood cells. O blood group is also known as the universal donor, because it can donate blood to any other blood group.

Hearing loss is a common problem throughout the world involving both male and female. Hearing loss may occur because of different factors e.g. otic trauma, infection and genetic diseases. The association between O blood group and hearing loss is not well established, and there are conflicting results from different studies. Some studies have suggested that O blood group might be a protective factor against hearing loss, while others have found no significant difference or even a higher risk of hearing loss in O blood group individuals

In the current study a possible link was found between hearing loss and O blood group. Both male and female showing significant association (P Value less than >0.05). The article by Ensari et in 2020[16] also investigated the relationship between hearing loss and blood groups. He took 100 control and 100 patients of hearing loss and studied the association of these two factors with each other. The author was of the view that blood groups modulate the immune response which brings changes in the vascular system of the ear. He concluded that most of the hearing loss was in the A group which was in contrast to present study. The possible explanation of this difference is that study was conducted in the different geographical conditions and he matched normal patients with the abnormal hearing patients while the current study was done on patients with hearing problems. A study by Kucur et al[17]. (2014) found no association between blood groups and hearing loss in Turkish population. Another study by Yilmaz et al [18]. (2015) reported that blood group B was more prevalent in 120 SSNHL patients than in 120 controls in a Turkish population. A study by Kaya et al [19]. (2016) found that blood group AB was more common in 100 SSNHL patients than in 100 controls in a Turkish population reported that blood group B was more prevalent in 120 SSNHL patients than in 120 controls in a Turkish population. A study by Kaya et al.**[19]** (2016) found that blood group AB was more common in 100 SSNHL patients than in 100 controls in a Turkish population.Babarindein 2021**[20]** also confirmed a positive association between blood groups and hearing loss further strengthening our hypothesis.

These difference of opinion between different researchers mean that more efforts should be done to investigate the association between blood groups and hearing loss**.**

## CONCLUSION

Blood groups and hearing loss are closely linked with each other.

**LIMITATIONS**

The first limitation of our study is its study design which is correlational however, many uncontrollable variables such as age , gender and genetic polymorphism can affect the hearing capabilities of an individual. Second the data was collected in a specific region of Hyderabad therefore the results of present study cannot be applicable to global population. Thirdly this study is conducted in one hospital so study results can't be applied on whole population.

**RECOMMENDATIONS:**

Further studies should be conducted in different regions of the world to globalize the result.

**CONFLICT OF INTEREST**

None

**REFRENCES**


Mitchell Veverka A, Luca Menozzib, Junjie Yao, The sound of blood: photoacoustic imaging in blood analysis, Medicine in Novel Technology and Devices,2023, 18, 100219

1. S. Su, L. Guo, T. Ma et al. International Journal of Infectious Diseases, 2022, 122, 21–29.
2. Li H-Y and Guo K. Blood Group Testing. Front. Med.2022, 9: 827619.doi: 10.3389/fmed.2022.827619
3. Dahalan NH, Tuan Din SA, Mohamad SMB. Association of ABO blood groups with allergic diseases: a scoping review. BMJ Open 2020; 10: e029559. doi:10.1136/bmjopen-2019-029559.
4. Berkman, Eugene M. and Lawler, Sylvia Dorothy. "blood group". Encyclopedia Britannica, 5 Sep. 2023, https://www.britannica.com/science/blood-group. Accessed 9 October 2023.
5. Archana Rai Sarve, MASLP1 Megha K.2 Devika Hem3, Does Hearing Thresholds Vary Across Different Blood Groups? J Health Allied Sci NU 2019; 1:21–25.
6. Jyothi Anand C, Mohammed Nadeem Afroze Malli*Prevalence of sensorineural hearing loss in type 2 diabetes mellitus, Int J Otorhinolaryngol Head Neck Surg. 2019 Sep;5(5):1227-1233, http://www.ijorl.com
7. Meneses-Barriviera CL, Bazoni JA, Doi MY, Marchiori LLM. Probable Association of Hearing Loss, Hypertension and Diabetes Mellitus in the Elderly. Int Arch Otorhinolaryngol. 2018 Oct;22(4):337-341. doi: 10.1055/s-0037-1606644. Epub 2017 Oct 25. PMID: 30357071; PMCID: PMC6197981.
8. Clícia Adriana S. Maia1, Carlos Alberto H. de Campos2, Diabetes Mellitus como causa de perdaauditiva, Rev Bras Otorrinolaringol, 2005, 71, n.2, 208-14, mar./abr. 2005. https://doi.org/10.1590/S0034-72992005000200015
9. BrajpalTyagi and ManikaFeotia. "Blood Group O and its Potential Association with Sensorineural Hearing Loss". Acta Scientific Otolaryngology,2023, 5,5,18-24.
10. Harun Doğru , Mustafa Tüz, Kemal Uygur, Correlation between blood group and noise-induced hearing loss, Acta Otolaryngol, 2003 Oct;123(8):941-2.
11. Prashanth Prabhu, Sneha Roslyn Shaji, Effect of different blood groups on tympanometric findings and acoustic reflex thresholds. Eur Arch Otorhinolaryngol. 2020 Dec; 277(12):3513-3518. doi: 10.1007/s00405-020-06244-9. Epub 2020 Jul 31. PMID: 32737643
12. Prabhu, P., Shaji, S.R., Vipinan, K.M. et al. Effect of different blood groups on tympanometric findings and acoustic reflex thresholds. Eur Arch Otorhinolaryngol 2020, 277, 3513–3518. https://doi.org/10.1007/s00405-020-06244-9
13. Chai Renjie, Li Hongzhe, Yang Tao, Sun Shan, Yuan Yongyi. Editorial: Hearing Loss: Mechanisms and Prevention , Frontiers in Cell and Developmental Biology 10, 2022. https://www.frontiersin.org/articles/10.3389/fcell.2022.838271 , DOI=10.3389/fcell.2022.83827, ISSN=2296-634X
14. Brewer CC, King KA. Genetic hearing loss: the audiologist's perspective. Hum Genet. 2022;141(3-4):311-314. doi: 10.1007/s00439-021-02360-6. Epub 2021 Sep 4. PMID: 34480642; PMCID: PMC8894500.
15. Ensari N, Kocak M, Kocak I, Ozturk M, Arslan N. The relationship between sudden sensorineural hearing loss and blood groups. Ankara Üniversitesi tıp fakültesimecmuası. 2020;73(1):1-6.
16. Kucur C, Durmus K, Ozturk M, Ismail O, Aksoy F, Hucumenoglu S. The role of ABO blood groups in the development of sudden sensorineural hearing loss: a retrospective clinical study. Eur Arch Otorhinolaryngol. 2014;271(8):2179-83
17. Yilmaz S, Guven M, Kaygusuz I, Yilmaz M, Sahin Y, Karatas E, et al. The relationship between ABO blood groups and idiopathic sudden sensorineural hearing loss: a retrospective clinical study.

Eur Arch Otorhinolaryngol. 2015;272 (6):1397-400.
18. Kaya S, Tatar A, Polat SB, Karahatay S, Halici M, Yilmaz A. The relationship between ABO blood groups and sudden sensorineural hearing loss: a retrospective clinical study. Eur Arch Otorhinolaryngol. 2016;273(10):3009-12.
19. Babarinde, J.A., Adeyemo, A.A. &Adeoye, A.M. Hearing loss and hypertension: exploring the linkage. Egypt J Otolaryngol, 2021, 37, 98. https://doi.org/10.1186/s43163-021-00162-1