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# Protective Antibodies Against Hepatitis A in the Healthcare Workers of a Tertiary Care Hospital

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Author`s Contribution

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**ABSTRACT**

Objective: To determine protective levels of anti-hepatitis A virus immunoglobulin G (anti-HAV IgG) in healthcare workers (HCWs) of a tertiary care hospital and evaluate its association with demographic variables, vaccination status and previous history of jaundice.

Methodology: This descriptive cross-sectional study was done at Provincial Headquarter Hospital, Gilgit, from September 2025 to February 2026 after ethical approval. After taking written informed consent, 355 HCWs were included using nonprobability convenience sampling. Their blood samples were taken through venipuncture using aseptic technique. The levels of anti-HAV antibodies were measured using a quantitative enzyme-linked immunosorbent assay (ELISA) kit. The data was entered and analyzed using the Statistical Package of Social Sciences (SPSS) version 27.

Results: Out of 355 HCWs, 338(95.2%) had protective levels of anti-HAV IgG. One hundred and four (29.3%) of the HCWs had a history of jaundice. Only 34(9.6%) of the HCWs were vaccinated. The antibody levels did not show any significant variations based on their age, gender, type of healthcare workers or vaccination. The majority of the healthcare workers with a previous history of jaundice had protective antibody levels, with a significant p-value of 0.0001.

Conclusion: The majority of healthcare workers in our setup are immune to HAV infection. A very few individuals among our population are vaccinated. A greater percentage of the HCWs have subclinical exposure, leading to seropositivity. All the vaccinated HCWs and most of the HCWs with a previous history of jaundice have protective antibody levels. Our results do not suggest routine testing of anti-HAV antibody levels and vaccination in our setup.

Keywords: Hepatitis A, Hepatitis A Antibodies, Immunoglobulin G, Healthcare Workers.

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## Introduction

The most prevalent cause of hepatitis in the world is the hepatitis A virus (HAV). The World Health Organization reports that 1.5 million people are affected by hepatitis A globally. The real statistics are expected to be 10 times greater than this, owing to underdiagnosis of the infection. Although the disease is associated with recovery in most of the cases, relapses can occur in 10-15% of patients. Persistent infection can also occur rarely. Around 0.5% of the deaths are linked to the illness. The mortality rate is very low in children but increases in middle age and adults. The incidence of infection has reduced in the developed nations owing to better lifestyles, hygienic conditions and vaccination. But developing countries are still fighting with a high disease burden.[1,2]

Pakistan is a hepatitis A endemic area. The real prevalence of the disease might be greater than the reported one due to variation in the clinical manifestations of the illness, inadequate access to healthcare facilities and non-availability of laboratories in rural areas. Hepatitis A outbreaks are common in lower socio-economic status. Unhygienic living conditions and poor sanitation contribute to the high prevalence of the

disease.[3] Acute hepatitis A cannot be reliably distinguished from other types of acute viral hepatitis on clinical presentation alone. Therefore, accurate diagnosis requires the evaluation of deranged liver function tests along with specific serological markers. Hepatitis A is diagnosed by anti-HAV antibodies: IgM and IgG. Anti-HAV IgM is present in acute phase, appear soon after the onset of illness and gradually decline to undetectable levels within 3–6 months. Anti-HAV IgG antibodies are positive after previous infection or vaccination. They develop within 2–3 months of infection and persist for a long period. The IgG antibodies are protective, and adequate levels provide life-long immunity.[4, 5] A study from Agha Khan Hospital, Karachi, reported that 59% of the patients presenting with jaundice had acute hepatitis A. The fecal-oral route of transmission of the infection facilitates its transmission and contributes to its high frequency.[6] Another study from Mayo Hospital, Lahore, revealed that the combined prevalence of hepatitis A and E was 59%.[4]

Hepatitis A poses a significant challenge to human health. Vaccination is an efficient and economical way of preventing the disease among the various prevention strategies. Many countries have taken the initiative on massive vaccination programs to combat hepatitis A. The healthcare workers (HCWs) are at a higher risk of acquiring hepatitis A owing to its route of transmission.[7,8]

This study aimed to determine the anti-HAV IgG levels in healthcare workers in order to assess their level of protection against hepatitis A virus. Studies have evaluated protective hepatitis A antibodies in the general population.[4,6] A very few studies have been conducted on HCWs. Such a study has not been conducted in Pakistan before. This will help us to evaluate the need for vaccination programs and manage infection risk during outbreaks.

# Methodology

This descriptive cross-sectional study was done at Provincial Headquarter Hospital, Gilgit, from September 2025 to February 2026 after ethical approval (No. 1105/PHQ/2024). Three hundred and fifty five healthcare workers (Paramedical staff, Nurses, Lab technicians, etc.) were included using nonprobability convenience sampling. The sample size was estimated by using 95% confidence level, 5% margin of error and an expected hepatitis A seropositivity of 36.5% in a study from Korea.9 Healthcare workers who had acute HAV infection or were unwilling to give consent were excluded. After taking written informed consent, the demographic details, history of previous HAV infection and vaccination of the participants were noted. Their blood samples were taken through venipuncture using aseptic technique and processed in the laboratory. The samples were centrifuged at 5000 revolutions per minute (rpm) for 5 minutes, and serum was separated. The levels of anti-HAV antibodies were measured using a quantitative enzyme-linked immunosorbent assay (ELISA) kit. The testing was performed according to the manufacturer's instructions of the kit (DIA. PRO diagnostic Bioprobes 20099, Milan, Italy). The test employs an enzyme immunoassay where a known antigen attached to the microtiter plate interacts with anti-HAV antibodies in the patient's serum. Following multiple washings, incubation, and addition of a substrate and stopping solution, color is produced that is then measured by a spectrophotometer. The color intensity is directly related to the concentration of IgG antibodies against HAV. Quantitative analysis of anti-HAV IgG was performed using standard calibration and cut-off values. Antibody levels >20 IU/L are considered protective against HAV infection.10

The data was entered and analyzed using the Statistical Package of Social Sciences (SPSS) version 27. The numeric variables, including age and anti HAV IgG levels, were reported by mean and standard deviation. Categorical variables such as gender, type of healthcare worker, history of vaccination or previous infection and cases with protective antibodies were expressed by frequency and percentage. The relation of protective antibodies with demographic and other variables was evaluated using the Pearson Chi-square test. The significant p-value was $<0.05$.

# Results

The mean age of the participants was 36.42+5.67 years. The highest number of the HCWs were 31-40 years of age (40%), followed by 21-30 years (32.1%), 41-50 years (18.9%) and 51-60 years (9%). Out of 355 healthcare workers, 120(33.8%) were male and 235(66.2%) were female. Most of the healthcare workers were nurses (59.2%), followed by paramedical staff (25.4%) and laboratory technicians (15.4%). One hundred and four (29.3%) of the HCWs had a history of jaundice, out of which 20(19.2%) HCWs had confirmed hepatitis A in the past. Only 34(9.6%) of the HCWs were vaccinated.

Out of 355 HCWs, 338(95.2%) had protective levels of anti-HAV IgG, whereas 17(4.8%) were unprotected. The

antibody levels did not show any significant variations based on their age, gender, or type of healthcare workers. Although all the vaccinated participants (9.6%) had protective anti-HAV IgG levels, the association was not significant. This may be due to high seropositivity and the small proportion of vaccinated HCWs, which makes the statistical difference insignificant. The majority of the participants with a previous history of jaundice had protective antibody levels, with a significant p-value of 0.0001. These results are shown in Table I.

# Discussion

Hepatitis A seropositivity varies from one region to another, and based on this, different regions are classified as high endemic area (if anti-HAV IgG >50%), moderate having anti-HAV IgG levels ranging between 15–50% and low endemic area with <15% anti-HAV IgG.[11]

Our study showed protective levels of anti-HAV IgG in a greater propotion (95.2%) of the HCWs. The antibody levels did not show any significant variations based on their age, gender, or type of healthcare workers. Although all the vaccinated participants (9.6%) had protective anti-HAV IgG levels, the association was not significant. This may be due to high seropositivity and the small proportion of vaccinated HCWs, which makes the statistical difference insignificant. The majority of the HCWs with a previous history of jaundice had protective antibody levels, with a significant p-value of 0.0001. Studies from various countries have also reported a higher prevalence of anti-HAV IgG among healthcare workers. A study conducted in India revealed that 97.2% of the HCWs had protective hepatitis A immunoglobulins. Anti-HAV IgG levels did not significantly differ between age groups or socio-economic classes. Out of all seropositive patients, 27(10.9%) had a history of previous jaundice.[12] A study from Turkey revealed positive anti-HAV IgG antibodies in 90.3% of the healthcare workers.[13] Noviello et al. reported 94.6% to 97% seroprotection rate for anti-HAV IgG in the healthcare workers, with a positive association with hepatitis A vaccination.[14] In contrast, some studies have reported comparatively lower seroprotection rates among healthcare workers. In a study by Sahin et al. from Turkey, anti-HAV IgG was positive in 43.1% of the HCWs. Healthcare workers with long working hours, nurses and paramedical staff had a higher seropositivity rate. Age and education were significantly linked to seropositivity, whereas gender and monthly income were not related factors.[15] Another study reported anti-HAV antibodies in 33.9% of the HCWs.[16] In Korea, 36.2% of the workers were positive for anti-HAV IgG.[9] In a study from Iran, anti-HAV IgG levels were positive in only 9.9% of the hospital staff. The levels were not different with respect to gender, age, type of hospital staff and wards.[17]

In Pakistan, a study done in children detected 100% hepatitis A seropositivity till 14 years of age, showing exposure to the infection in childhood.[18] A study from India reported anti-HAV IgG levels from different states. The seropositivity was 90%. It has a positive relation with age, with the highest frequency of anti-HAV IgG in 16-30 years (97.5%), followed by 11-15 years (87.4%)

**Table I: Association of Protective Anti-HAV IgG Levels with Different Variables.**

| Variables | | Anti-HAV IgG Levels | | | Chi-Square Value | p-value |
|---|---|---|---|---|---|---|
| | | Protective | Unprotective | Total | | |
| | | N (%) | N (%) | N (%) | | |
| Gender | Male | 115 | 5 | 120(33.8%) | 0.993 | 0.31 |
| | Female | 223 | 12 | 235(66.2%) | | |
| | **Total** | **338(95.2%)** | **17(4.8%)** | **355(100%)** | | |
| Age Groups (Years) | 21-30 | 106 | 8 | 114(32.1%) | 2.617 | 0.45 |
| | 31-40 | 138 | 4 | 142(40%) | | |
| | 41-50 | 64 | 3 | 67(18.9%) | | |
| | 51-60 | 30 | 2 | 32(9%) | | |
| | **Total** | **338(95.2%)** | **17(4.8%)** | **355(100%)** | | |
| Type of HCW | Nurses | 201 | 9 | 210(59.2%) | 0.286 | 0.87 |
| | Paramedical Staff | 85 | 5 | 90(25.4%) | | |
| | Lab Technician | 52 | 3 | 55(15.4%) | | |
| | **Total** | **338(95.2%)** | **17(4.8%)** | **355(100%)** | | |
| Vaccination Status | Vaccinated | 34 | 0 | 34(9.6%) | 1.885 | 0.16 |
| | Unvaccinated | 304 | 17 | 321(90.4%) | | |
| | **Total** | **338(95.2%)** | **17(4.8%)** | **355(100%)** | | |
| Previous History of Jaundice | Yes | 92 | 12 | 104(29.3%) | 14.654 | 0.0001* |
| | No | 246 | 5 | 251(70.7%) | | |
| | **Total** | **338(95.2%)** | **17(4.8%)** | **355(100%)** | | |

and 6-10 years (77.9%).[19] Another study reported 91.2% seropositivity for anti-HAV IgG among the general population. None of them were vaccinated. The factors associated with seropositivity were male gender, family size, education of parents and history of jaundice.[20] A study determining hepatitis A seroprevalence in children showed a significant positive association of anti-HAV IgG with previous history of jaundice and vaccination.[21]

The study was conducted at a single hospital with a relatively small sample size. The small number of seronegative HCWs, along with the low proportion of vaccinated participants, limited our ability to establish a clear relationship between vaccination status and protective anti-HAV IgG levels. The association between a history of jaundice and protective antibody levels may be subject to recall bias, as previous episodes of jaundice were based on patient history and were not confirmed through medical records or diagnostic testing for hepatitis A. Further multicenter studies recruiting HCWs from various areas of Pakistan and a larger sample size are needed for screening purposes.

# Conclusion

The majority of healthcare workers in our setup are immune to HAV infection. A very few individuals among our population are vaccinated. A greater percentage of the HCWs have subclinical exposure, leading to seropositivity. All the vaccinated HCWs and most of the HCWs with a previous history of jaundice have protective antibody levels. Our results do not suggest routine testing of anti-HAV antibody levels and vaccination in our setup.

# References


1. Gholizadeh O, Akbarzadeh S, Ghazanfari-Hashemi M, Gholami M, Amini P, Yekanipour Z, et al. Hepatitis A: viral structure, classification, life cycle, clinical symptoms, diagnosis error, and vaccination. Can J Infect Dis Med Microbiol. 2023;2023:4263309. https://doi.org/10.1155/2023/4263309
2. Savicka O, Zeltmatis R, Storozenko J. Molecular epidemiology of hepatitis A outbreaks and sporadic cases, Latvia, 2017 to 2019. Euro Surveill. 2022;27(11):2100415. https://doi.org/10.2807/1560-7917.ES.2022.27.11.2100415
3. Badar A, Malik MW, Hasnain SZ, Shah SIA, Shabbir RMK, Haider W, et al. Assessment of risk factors associated with outbreak of hepatitis A in Shakrial, Rawalpindi, Pakistan. J Infect Dev Ctries. 2023;17(1):111-7. https://doi.org/10.3855/jidc.14939
4. Gulzar R, Dar R, Qurat ul Ain, Ahmad H, Shah SSA, Sajjad H. Frequency of hepatitis A and E infections in adult patients of acute hepatitis. **Esculapio.** 2020;16(3):84-8.
5. Hunderkar S, Ganorkar N, Walimbe A, Lole K. Evaluation of hepatitis A virus recombinant proteins for detecting anti-HAV IgM and IgG antibodies. Microbiol Spectr. 2025;13(4):e0152824. https://doi.org/10.1128/spectrum.01528-24
6. Shahid Y, Butt AS, Jamali I, Ismail FW. Rising incidence of acute hepatitis A among adults and clinical characteristics in a tertiary care center of Pakistan. World J Virol. 2025;14(1):97482. https://doi.org/10.5501/wjv.v14.i1.97482
7. Migueres M, Lhomme S, Izopet J. Hepatitis A: epidemiology, high-risk groups, prevention and research on antiviral treatment. Viruses. 2021;13(10):1900. https://doi.org/10.3390/v13101900
8. Gursoy E, Kilınçer M, Yanmaz G, Yagız M. Hepatitis A seroprevalence and factors affecting hepatitis A vaccination among healthcare workers in a university hospital. Viral Hepat J. 2023;28(3):103-9. https://doi.org/10.4274/vhd.galenos.2023.2023-2-1
9. Mun E, Lee Y, Suh B, Kim W, Jeong J, Park H, et al. Factors associated with anti-hepatitis A virus immunoglobulin G seropositivity among Korean workers: a cross-sectional study. BMJ Open. 2020;10(6):e036727. https://doi.org/10.1136/bmjopen-2019-036727
10. Mouna L, Akhavan S, Jadoui A, Chevaliez S, Griscelli F, Laperche S, et al. Accuracy assessment of total or IgG immunoglobulin to hepatitis A virus tests around immunity threshold. J Clin Virol. 2022;146:105059. https://doi.org/10.1016/j.jcv.2021.105059
11. Karabey M, Alacam S, Karabulut N, Uysal H, Gunduz A, Aydina OA. Hepatitis A virus infection and seroprevalence, Istanbul, Turkey, 2020-2023. Ann Saudi Med. 2024;44(6):386-93. https://doi.org/10.5144/0256-4947.2024.386
12. Chauhan S, Agarwal J, Jain A, Sawlani KK, Gupta P, Goel A, et al. Status of adult immunity to hepatitis A virus in healthcare workers from a tertiary care hospital in North India. Indian J Med Res. 2019;150(5):508-11. https://doi.org/10.4103/ijmr.IJMR_787_18
13. Ceylan MR, Celik M, Gurbuz E, Esmer F, Koc S. Seroprevalence of hepatitis A, hepatitis B, hepatitis C and HIV in healthcare workers. Online Turk J Health Sci. 2022;7(3):420-4. https://doi.org/10.26453/otjhs.1062233
14. Noviello C, Arico M, Scazzi FL, Riformato G, Florio O, Furio A, et al. Long-term persistence of hepatitis A virus immunity in healthcare workers up to 25 years after vaccination. J Viral Hepat. 2026;33(6):e70187. https://doi.org/10.1111/jvh.70187
15. Sahin AM, Tekin A, Basmaci C, Kes NU, Sonmez E. Hepatitis A seropositivity and characteristics among

healthcare workers in a training and research hospital in Istanbul. Med Sci Discov. 2016;3(8):296-300. https://doi.org/10.36472/msd.v3i8.160

16. Karadeniz A, Akduman Alasehir E. Seroepidemiology of hepatitis viruses, measles, mumps, rubella and varicella among healthcare workers and students: should we screen before vaccination? J Infect Public Health. 2020;13(4):480-4. https://doi.org/10.1016/j.jiph.2020.01.309
17. Eilami O, Tavana V, Omidifar N, Heiran A. Hepatitis A and hepatitis E seroprevalence amongst hospital staff in Southwestern Iran: a cross-sectional study. Discov Soc Sci Health. 2025;5(1):102. https://doi.org/10.1007/s44155-025-00255-9
18. Butt AS, Sharif F. Viral hepatitis in Pakistan: past, present, and future. Euroasian J Hepatogastroenterol. 2016;6(1):70-81. https://doi.org/10.5005/jp-journals-10018-1172
19. Kumar MS, Kumar CPG, Saravanakumar V, Karunakaran T, Vivian-Thangaraj JW, Selvaraju S, et al. Seroprevalence of IgG antibodies against hepatitis A infection among individuals aged 6-30 years in India, 2021: a nationwide population-based cross-sectional study. Lancet Reg Health Southeast Asia. 2025;41:100669. https://doi.org/10.1016/j.lansea.2025.100669
20. Bakhshipour I, Sargolzaie N, Rafaiee R. Status of immunity against the hepatitis A virus in healthy population: a report from Southeastern Iran. Arch Clin Infect Dis. 2021;16(4):e118869. https://doi.org/10.5812/archcid.118869
21. Gupta R, Sanjeev RK, Agarwal A, Tomar RPS, Kumar N, Dutt V, et al. A study of hepatitis A virus seropositivity among children aged between 1 and 5 years of age: implications for universal immunization. Med J Armed Forces India. 2019;75(3):335-8. https://doi.org/10.1016/j.mjafi.2018.11.007