

## Assessing knowledge, attitudes, and practices of general practitioners toward chronic hepatitis B in Muscat governorate

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### Abstract

**Background:** Chronic hepatitis B virus (HBV) infection is a global challenge, with primary care physicians playing a key role in its management. Despite the success of Oman's vaccination program in reducing prevalence, gaps in physician knowledge and practice may hinder effective care. **Objective:** This study aims to assess the knowledge, attitudes, and practices (KAP) of Omani general practitioners (GPs) regarding HBV for the first time. **Methods:** The cross-sectional study included 280 GPs in Muscat Governorate. GPs were approached directly at their health centers during working hours. The investigator distributed hard copies of the questionnaire after coordinating with each center's supervising physician. For those on afternoon shifts, questionnaires were left with supervisors for completion. The questionnaire, adapted from a validated 2014 study on KAP towards CHB in Saudi Arabia, was rigorously validated. It included sections on demographics, knowledge, practice, and attitudes, with a cover page containing study details and informed consent. **Result:** Out of the 280 GP participants, 186 (71.54%) responded and took part in the study. The mean scores were as follows: knowledge 67.12/100 ( $\pm 16.45$ ), indicating critical gaps such as misconceptions about perinatal chronicity, treatment efficacy, and genotype awareness; attitudes 68.26/100 ( $\pm 10.45$ ), with only 33.5% expressing low occupational concern; practices 84.91/100 ( $\pm 9.53$ ), although there were gaps in areas like vaccination recognition and confidence in managing HBsAg+ cases. Practice scores were significantly correlated with age over 40 years, non-Omani nationality, foreign medical training, and experience over 20 years. Knowledge had a weak influence on practice ( $r = 0.17$ ). **Conclusion:** Omani GPs show moderate knowledge, positive attitudes, and strong practices regarding HBV care, but there are still significant gaps. Targeted continuing medical education is crucial to improve HBV care in Oman and align with global elimination goals.

### Introduction

Hepatitis B is a liver infection caused by the hepatitis B virus (HBV) that can be prevented with vacci-

nation. The virus spreads through infected bodily fluids like blood, semen, or through sexual contact, sharing needles, or from mother to child during pregnancy or delivery. Infants are at the highest risk of chronic infection, with approximately 90% of infected newborns developing lifelong HBV<sup>1</sup>. According to the World Health Organization (2015), an estimated 257 million people (3.5% of the global population) had chronic hepatitis B (CHB), leading to approximately 887,000 deaths that year, mainly due to complications like liver cirrhosis and hepatocellular carcinoma (HCC)<sup>2</sup>. Primary healthcare physicians play a vital role in managing chronic hepatitis B since most cases are detected at the primary care level. General practitioners (GPs) are tasked with screening high-risk populations, conducting diagnostic evaluations, and providing ongoing monitoring, including regular liver enzyme tests, alpha-fetoprotein assessments, and abdominal ultrasounds. Moreover, GPs need to screen family contacts and administer vaccinations based on patients' immunization status. However, studies have shown gaps in GP knowledge and adherence to guidelines. A 2012 European study revealed that screening practices for viral hepatitis often varied based on individual physician discretion, underscoring the importance of improved guideline implementation<sup>3</sup>. Research in Victoria, Australia, showed that there is low awareness of HBV testing among GPs, especially among older, male, or internationally trained practitioners<sup>4</sup>. In Vietnam, healthcare workers need additional training to correct misconceptions and enhance HBV prevention strategies<sup>5</sup>. In Australia, GPs showed good knowledge of HBV serology and risk-group screening, but they lacked understanding of treatment options. This trend was also observed in Saudi Arabia, where physicians displayed positive attitudes but had insufficient knowledge<sup>6,7</sup>. In Oman, the prevalence of CHB was historically 2–7% before the introduction of the HBV vaccine in 1990<sup>8</sup>. Thanks to high vaccination coverage (>95% by 2005), HBV incidence has declined<sup>9</sup>. However, hepatocellular carcinoma remains a concern, with 60 reported cases in 2019—85% of which were linked to chronic liver conditions, including HBV<sup>10</sup>. A study among Omani medical students

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revealed general awareness of HBV transmission but persistent misconceptions about prevention and attitudes<sup>11</sup>. Assessing the knowledge, attitudes, and practices of GPs is essential for improving patient care and addressing systemic challenges. This study aims to assess factors affecting the management of HBV among Omani GPs, as no previous research has explored this topic. The findings will help identify gaps and improve the primary healthcare system's capacity to effectively handle HBV.

### Population and Method

This cross-sectional survey targeted all general practitioners (GPs) working in primary healthcare centers across Muscat Governorate in 2024. The study aimed to include the entire population of 280 GPs. A minimum sample size of 163 was calculated based on a 95% confidence interval and a 5% margin of error. However, all 280 GPs were invited to participate to enhance statistical power. A total of 186 GPs responded, resulting in a response rate of 71.54%. GPs were approached directly at their health centers during working hours. The investigator distributed hard copies of the questionnaire after coordinating with each center's supervising physician to allocate 10 minutes for completion. For GPs on afternoon shifts, questionnaires were left at their respective centers, with follow-up encouragement from supervisors to ensure submission. A validated questionnaire from a 2014 Saudi Arabian study assessing KAP (knowledge, attitudes, and practices) toward chronic hepatitis B (CHB) was adapted<sup>7</sup>. The original tool underwent rigorous validation by a panel of experts including gastroenterologists, hepatologists, community medicine specialists, and biostatisticians, and was pilot-tested before deployment. The questionnaire included a cover page with study details and informed consent, as well as sections for demographic information, knowledge assessment, practice evaluation, and attitude analysis.

### Statistical analysis

SPSS-version 29 was used for statistical analysis. Categorized variables were presented as frequencies and percentages, while continuous variables were presented as mean  $\pm$  standard deviation (SD), median, and interquartile range (IQR). Knowledge, attitude and practice items were described in proportions, and an overall score for each domain was calculated out of 100 scores (from 0 – 100). For the overall scores, mean  $\pm$ SD, median, and interquartile range (IQR) were calculated. Associations were assessed by Independent-Samples Mann-Whitney U test, Independent-Samples Kruskal-Wallis test, and Spearman correlation coefficient (r) depending on nature of data.

### Results

Out of 260 invitations, 186 general practice physicians responded to the questionnaire, yielding a response rate of 71.54%. Females dominated the sample (87.6%). Omanis constituted 81.2% of the study sample. Most (59.7%) of the participants aged 30 – 40 years, and only 4.8% are above 50 years of age. Around half of the studied sample graduated from the National College, 37% graduated from Sultan Qaboos University, and 13% graduated abroad. Around 40.8% of the included physicians had work experience of 10–20 years, and 28.8% had an experience of 5 years or less.

Majority (92.5%) did not receive any training in chronic HBV infection. **Table 1** details the general characteristics of the study sample.

### Knowledge assessment

The average knowledge score in the knowledge domain was 67.12 out of 100, with a standard deviation of 16.45 and a median of 6.67. Scores ranged from 22.22 to 100.0. While most participants answered correctly, three questions stood out. A significant portion (65.4%) incorrectly answered the question about perinatal infection, specifically regarding whether chronic infection develops in almost all perinatally infected children. Approximately 68% gave incorrect answers about the treatment of HBV, stating that treatment for chronic viral hepatitis B is very expensive and not always effective. Furthermore, over half of the participants incorrectly identified the number of HBV genotypes, answering incorrectly to the question that seven genotypes of HBV have been identified labelled A through G. **Table 2** provides a detailed breakdown of correct and incorrect responses within the study sample.

### Attitude assessment

In relation to attitude assessment, the overall mean attitude score was 68.26  $\pm$  10.45, with a median of 69.44, and minimum – maximum of 38.89 – 91.67 out of 100 score. Reasonable proportions of participants reported a good attitude in most items. However, only 33.5% reported good attitude (strongly disagree or disagree) in their concern to get HBV from their patients. In addition, only 21.3% of participants believe that HBV is difficult to be eradicated.

### Practice assessment

The overall mean practice score was 84.91  $\pm$  9.53, with a median of 88.46, and minimum – maximum of 50.0 – 100.0. Participants reported good practice in most items. However, only 18.4% of participants underestimated the effect of irregular food regimen in the management of HBV infection. In addition, only 45.6% of participants acknowledge the need for hepatitis A vaccine among HBV patients. Furthermore, only 48.9% were confident in dealing with patient who is HBsAg positive. **Figure 1** compared the median score for the three domains among the study sample. **Table 3** shows the distribution of responses to various items of practice domain among the study sample. Regarding factors affecting attitude level among the study participants, it seemed that the median attitude level was slightly higher among Omanis compared to non-Omanis (69.44 vs. 63.89), however, the difference was not significant (p 0.129). In addition, all other studied factors including gender, age, nationality, medical school, work experience, HBV training, and knowledge level showed no significant association with attitude score (all p-values > 0.05). On the other hand, findings showed that the practice level is significantly associated with age, nationality, medical school, work experience, and knowledge level. In this regard, the median practice score was significantly higher (92.31) among participants aged > 40 years, compared to 84.62 among participants aged < 40 years (p < 0.001). Similar figures were observed for non-Omanis who reported a better practice level compared to Omanis respectively (p 0.003). In addition, participants who graduated from abroad reported significantly higher level (92.31) of practice compared to local graduates (84.62), with a p-value of 0.004. A trend of increasing practice level was observed with increasing years of work experience, **fig. 2**. In this regard, the median practice level was 84.62

among participants with 10 years of experience or less, compared to 88.46 among participants with work experience of 10–20 years, and 92.31 among participants with > 20 years of work experience ( $p$  0.001). Furthermore, there was a significant positive correlation between knowledge score and practice score ( $p$  0.033), however the correlation coefficient

was weak (0.17). Other factors, including gender, HBV training, and attitude score did not show significant association with practice level. The crude association findings between various factors and practice level are shown in [tab. 4](#).

**Table 1.** Demographic Characteristics of Study Participants (n=186)

| Characteristic  | Category    | n (%)       |
|-----------------|-------------|-------------|
| Gender          | Male        | 23 (12.4%)  |
|                 | Female      | 163 (87.6%) |
| Nationality     | Omani       | 151 (81.2%) |
|                 | Non-Omani   | 35 (18.8%)  |
| Age Group       | <30 years   | 33 (17.7%)  |
|                 | 30-40 years | 111 (59.7%) |
|                 | 41-50 years | 33 (17.7%)  |
|                 | >50 years   | 9 (4.8%)    |
| Work Experience | ≤5 years    | 53 (28.8%)  |
|                 | 5-10 years  | 43 (23.4%)  |
|                 | 10-20 years | 75 (40.8%)  |
|                 | >20 years   | 13 (7.1%)   |

**Table 2.** Distribution of Knowledge Domain Items and Overall Knowledge Score

| Item  | Correct n (%) | Incorrect n (%) |
|---|---------------|-----------------|
| 1. Acute infection may cause nonspecific symptoms (n=185)                             | 171 (92.4%)   | 14 (7.6%)       |
| 2. Chronic infection will develop in almost all children infected perinatally (n=185) | 64 (34.6%)    | 121 (65.4%)     |
| 3. Transmission after needlestick is higher for HIV vs. HBV (n=184)                   | 136 (73.9%)   | 48 (26.1%)      |
| 4. Seven HBV genotypes (A–G) identified (n=186)                                       | 85 (45.7%)    | 101 (54.3%)     |
| 5. HBsAg+ and HBeAg+ mothers transmit HBV to 70–90% of offspring (n=183)              | 155 (84.7%)   | 28 (15.3%)      |
| 6. Chronic HBV treatment is costly and not always effective (n=181)                   | 58 (32.0%)    | 123 (68.0%)     |
| 7. Vaccination is the most effective HBV prevention (n=183)                           | 155 (84.7%)   | 28 (15.3%)      |
| 8. HBV replicates only in hepatocytes (n=186)   | 131 (70.4%)   | 55 (29.6%)      |
| 9. Chronic HBV defined by HBsAg persistence (n=178)                                   | 144 (80.9%)   | 34 (19.1%)      |



**Figure 1.** Median knowledge, attitude and practice scores among the study sample

**Table 3.** Distribution of practice domain items and overall practice score

| Item   | Agree n (%) | Neutral n (%) | Disagree n (%) |
|--|-------------|---------------|----------------|
| 1. I would take care of an infected person with HBV (n=183)                            | 163 (89.1)  | 19 (10.4)     | 1 (0.5)        |
| 2. Persons with chronic HBV infection should be monitored for disease activity (n=185) | 178 (96.2)  | 7 (3.8)       | 0 (0.0)        |
| 3. Sexual partners should be immunized (n=185)   | 179 (96.8)  | 5 (2.7)       | 1 (0.5)        |
| 4. Involvement of the family in education of persons infected with HBV (n=186)         | 168 (90.3)  | 14 (7.5)      | 4 (2.2)        |
| 5. All medications should be taken under physician instructions (n=186)                | 147 (79.0)  | 34 (18.3)     | 5 (2.7)        |
| 6. Irregular food regimen can worsen HBV infection (n=185)                             | 34 (18.4)   | 88 (47.6)     | 63 (34.1)      |
| 7. Do not share toothbrushes or razors (n=184)   | 162 (88.0)  | 18 (9.8)      | 4 (2.2)        |

|   |            |           |           |
|---|------------|-----------|-----------|
| 8. HBV patients not immune to hepatitis A should receive two doses of Hep A vaccine (n=182) | 83 (45.6)  | 72 (39.6) | 27 (14.8) |
| 9. Get HBV vaccination before traveling to endemic regions (n=185)                          | 118 (63.8) | 41 (22.2) | 26 (14.1) |
| 10. Healthcare professionals should receive HBV vaccine (n=183)                             | 177 (96.7) | 6 (3.3)   | 0 (0.0)   |
| 11. Encourage family/close contacts to get tested (n=185)                                   | 149 (80.5) | 29 (15.7) | 7 (3.8)   |
| 12. Collaboration with health professionals is critical for HBV care (n=186)                | 173 (93.0) | 12 (6.5)  | 1 (0.5)   |
| 13. I feel confident in dealing with HBsAg-positive patients (n=184)                        | 90 (48.9)  | 83 (45.1) | 11 (6.0)  |



**Figure 2.** Distribution of median practice score according to years of experience

**Table 4:** Crude associations between practice level and various factors

| Factor          | Categories                     | Median (IQR) Practice Score | P-Value |
|-----------------|--------------------------------|-----------------------------|---------|
| Gender          | Male (n=169)                   | 88.46 (79.81–92.31)         | 0.508   |
|                 | Female                         | 84.62 (76.92–92.31)         |         |
| Age Groups      | < 30 years                     | 84.62 (76.92–88.46)         | <0.001  |
|                 | 30–40 years                    | 84.62 (76.92–92.31)         |         |
|                 | 41–50 years                    | 92.31 (88.46–96.15)         |         |
|                 | >50 years                      | 92.31 (88.46–96.15)         |         |
|                 |                                |                             |         |
| Nationality     | Omani                          | 84.62 (76.92–92.31)         | 0.003   |
|                 | Non-Omani                      | 92.31 (88.46–92.31)         |         |
| Medical School  | Sultan Qaboos University (SQU) | 84.62 (76.92–92.31)         | 0.004   |
|                 | National College               | 84.62 (76.92–92.31)         |         |
|                 | Abroad                         | 92.31 (88.46–96.15)         |         |
| Work Experience | ≤5 years                       | 84.62 (74.04–88.46)         | 0.001   |
|                 | 5–10 years                     | 84.62 (76.92–92.31)         |         |
|                 | 10–20 years                    | 88.46 (80.77–92.31)         |         |
|                 | >20 years                      | 92.31 (88.46–96.15)         |         |
| HBV Training    | No                             | 86.54 (76.92–92.31)         | 0.739   |
|                 | Yes                            | 88.46 (76.92–94.23)         |         |
| Knowledge Level | Correlation (r)                | 0.170                       | 0.033   |
| Attitude Level  | Correlation (r)                | 0.054                       | 0.507   |

## Discussion

This study assessed the knowledge, attitudes, and practices of general practice physicians in Oman concerning chronic HBV infection, revealing a response rate of 71.54% from 186 participants. The demographic profile showed a predominance of females (87.6%) and Omanis (81.2%), with most participants aged 30–40 years (59.7%) and a significant proportion lacking specific training in chronic HBV (92.5%). These characteristics provide context for interpreting the KAP scores and their implications for healthcare delivery in Oman. Knowledge domain: the mean knowledge score of  $67.12 \pm 16.45$  indicates a moderate level of understanding among participants, though significant gaps were evident in specific areas which are consistent with studies in Saudi Arabia and Australia<sup>6,7</sup>. Notably, 65.4% incorrectly believed that chronic infection develops in nearly all perinatally infected children, contrasting

with evidence that approximately 90% of such infections become chronic, depending on maternal viral markers like HBe Ag positivity<sup>8,12</sup>. Similarly, 68% inaccurately viewed HBV treatment as universally expensive and ineffective, despite advances in antiviral therapies such as tenofovir and entecavir, which are cost-effective and highly efficacious in suppressing viral replication<sup>13</sup>. Additionally, over half (54.3%) were unaware of the seven HBV genotypes (A–G), which are critical for understanding geographic variations in disease progression and treatment response<sup>14</sup>. These knowledge deficits align with findings from a Saudi study where primary care physicians scored poorly on HBV transmission and management<sup>15</sup> suggesting a regional challenge in medical education and continuing professional development (CPD). The lack of HBV training (92.5%) likely contributes to these gaps, as training has been shown to enhance physicians' competence in



managing infectious diseases<sup>5,16</sup>. This finding underscores the need for targeted educational interventions in Oman, particularly given the national HBV prevalence of approximately 2–5%<sup>17</sup>. In the Attitude Domain, the mean attitude score of  $68.26 \pm 10.45$  indicates a generally positive disposition toward HBV management, with some specific concerns still present. Only 33.5% expressed low concern about contracting HBV from patients, showing a prevalent fear of occupational exposure, which is consistent with studies in Pakistan where healthcare workers had similar apprehensions<sup>18</sup>. This fear may be due to inadequate knowledge about transmission risks, as needle stick injuries pose a higher risk for HBV than HIV (73.9% answered correctly), yet misconceptions still exist. On the other hand, 76.5% showed no concern about casual contact (e.g., shaking hands or hugging), in line with global guidelines that HBV is not transmitted through such means<sup>19</sup>. The low stigma perception (88.6% disagreed that chronic HBV is shameful) is encouraging and contrasts with findings from East Asia and a study conducted on Omani medical students, where HBV is associated with significant social stigma<sup>20,11</sup>. Interestingly, no demographic or training factors significantly influenced attitude scores (all  $p > 0.05$ ), suggesting that attitudes may be shaped by broader cultural or professional norms rather than individual characteristics. This stability could facilitate uniform interventions to address specific attitudinal barriers. In the Practice Domain, the high mean practice score ( $84.91 \pm 9.53$ ) indicates strong adherence to recommended HBV management practices, such as monitoring disease activity (96.2%) and vaccinating sexual partners (96.8%). However, there were deficiencies noted: only 45.6% recognized the need for hepatitis A vaccination in HBV patients, similar to gaps observed by Australian GPs<sup>6</sup>, despite guidelines recommending 6, dual immunization to prevent co-infection complications<sup>21</sup>. Additionally, just 48.9% felt confident in managing HBsAg-positive patients, and only 18.4% correctly assessed the impact of irregular diets on HBV progression, highlighting gaps in practical application of knowledge similar to those in Saudi Arabia<sup>7</sup>. Practice levels were significantly associated with age, nationality, medical school, work experience, and knowledge. Older physicians (>40 years) and those with over 20 years of experience scored higher (median 92.31), likely due to cumulative clinical exposure. Non-Omanis and physicians trained abroad also outperformed their counterparts, possibly reflecting diverse training standards or selection bias among expatriates. The weak positive correlation between knowledge and practice ( $r = 0.17$ ,  $p = 0.033$ ) suggests that while knowledge informs practice, other factors—such as confidence or resource availability—play a role. These findings are consistent with those from Egypt<sup>22</sup>. The findings of our study have several implications for healthcare in Oman. The moderate knowledge and practice gaps, along with the near-universal lack of HBV training, emphasize the urgent need for continuing professional development (CPD) programs tailored to general practitioners, similar to those found in Vietnam<sup>5</sup>. Enhancing knowledge about perinatal transmission, genotypes, and treatment efficacy could improve patient outcomes, particularly considering the burden of HBV in the region. The positive attitudes and high practice scores lay a foundation for such interventions, while addressing occupational fears could enhance physician

confidence and reduce unnecessary precautions. This study has limitations. The self-reported nature of the questionnaire may introduce social desirability bias, potentially inflating practice scores. The predominance of female and Omani participants may limit generalizability to other demographics or regions. Additionally, the cross-sectional design precludes making causal inferences about factors influencing KAP. The lack of qualitative data also restricts insights into underlying reasons for knowledge gaps or attitudinal concerns. Future research should explore longitudinal trends in knowledge, attitudes, and practices (KAP) following training interventions to assess their effectiveness. Qualitative studies could help identify barriers to knowledge acquisition and confidence in managing hepatitis B virus (HBV). Including specialists or rural practitioners in the sample may uncover additional disparities. Lastly, examining patient-level outcomes associated with physician KAP could help quantify the clinical impact of these findings.

### Conclusion

*General practice physicians in Oman demonstrate moderate knowledge, positive attitudes, and strong practices towards chronic HBV. However, there are critical gaps, especially in knowledge and confidence. Targeted training programs and improved medical education could help address these gaps and enhance HBV management in primary care settings.*

### References

- Centers for Disease Control and Prevention (2024). *Hepatitis B facts, statistics, data and guidelines*. Atlanta, GA: CDC.
- World Health Organization. (2017). *Global hepatitis report, 2017*. Geneva: WHO, Licence: CC BY-NC-SA 3.0 IGO.
- Bechini, A., Levi, M., Falla, A., et al. (2016). The role of the general practitioner in the screening and clinical management of chronic viral hepatitis in six EU countries. *J Prev Med Hyg*, 57 (2): E51-E60.
- van Gemert, C., Howell, J., Wang, J., et al. (2017). Knowledge and practices of chronic hepatitis B virus testing by general practitioners in Victoria, Australia, 2014-2015. *Aust Fam Physician*, 46 (9): 683-689.
- Hang Pham, T., Le, T., Nguyen, D., et al. (2019). Knowledge, attitudes and medical practice regarding hepatitis B prevention and management among healthcare workers in Northern Vietnam. *PLoS One*, 14 (10): e0223733.
- Xiao, Y., van Gemert, C., Howell, J., et al. (2022). A survey of knowledge, attitudes, barriers and support needs in providing hepatitis B care among GPs practising in Australia. *BMC Prim Care*, 23 (1), doi:10.1186/s12875-022-01754-3.
- Homoud, A. (2014). Knowledge, attitudes and practice of primary healthcare physicians concerning the occupational risks of hepatitis B virus in Al Jouf Province, Saudi Arabia. *J Infect Public Health*, 7 (4): 257-270.
- Al Awaidy, S., Abu-Elyazeed, R., Al Hosani, H., et al. (2006). Sero-epidemiology of hepatitis B infection in pregnant women in Oman, Qatar and the United Arab Emirates. *J Infect*, 52 (3): 202-206.
- Al Awaidy, S., Bawikar, S., Al Busaidy, S., et al. (2013). Progress toward elimination of hepatitis B virus transmission in Oman: Impact of hepatitis B vaccination. *Am J Trop Med Hyg*, 89 (4): 811-815.

10. Al Farai, A. (2019). Surgical oncology – Gastrointestinal cancers program. In: **Sultan Qaboos Comprehensive Cancer Center Annual Report**. Muscat, SQUH, 203.
11. Al-Jabri, A., Al-Adawi, S., Al-Abri, J., et al. (2004). Awareness of hepatitis B virus among undergraduate medical and non-medical students. *Saudi Med J*, 25 (4): 484-487.
12. Lok, A. & McMahon, B. 2007 (). Chronic hepatitis B: Update 2007. *Hepatology*, 45 (2): 507-539.
13. Terrault, N., Lok, A., McMahon, B., et al. (2018). AASLD guidelines for treatment of chronic hepatitis B. *Hepatology*, 67 (1): 156-199.
14. Kramvis, A. (2014). Genotypes and genetic variability of hepatitis B virus. *Intervirology*, 57 (3-4) :141-150.
15. Al-Jabri, A., Al-Shehri, M. & Al-Harthi, H. (2019). Knowledge, attitudes, and practices of primary care physicians regarding hepatitis B in Saudi Arabia. *J Family Med Prim Care*, 8 (3): 1032-1037.
16. Hwang, J., Roundtree, A. & Suarez-Almazor M. (2016). Impact of continuing medical education on hepatitis B
17. management. *J Contin Educ Health Prof*, 36 (3): 178-184.
18. Al-Baqlani, S., Al Busaidi, S., Al Mahrouqi, S., et al. (2012). Prevalence of hepatitis B virus infection in Oman. *Saudi Med J*, 33 (6): 654-659.
19. Ali, M., Khan, A., Malik, F., et al. (2017). Hepatitis B virus awareness among healthcare workers in Pakistan. *Infect Dis J*, 26 (2): 45-50.
20. World Health Organization. (2020). **Hepatitis B fact sheet**. Geneva: WHO, Report No.: WHO/CDS/HIV/20.1.
21. Yang, T., Wu, L., Wang, Y., et al. (2019). Stigma and hepatitis B in East Asian communities. *J Viral Hepat*, 26 (5): 567-573.
22. Centers for Disease Control and Prevention. (2021). Hepatitis B vaccination recommendations. *MMWR Morb Mortal Wkly Rep*, 70 (4), doi:10.15585/mmwr.rr7004a1.
23. Shalaby, S., Khamis, N., Hassan, E., et al. (2020). Knowledge, attitude, and practice of Egyptian physicians towards hepatitis B and C. *Egypt Liver J*, 10 (1), doi: 10.1186/s43066-020-00023-1.