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Original Article

Knowledge about hepatitis B and influencing factors among the residents in Qingdao: a cross-sectional study

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Abstract

Introduction: This study investigated the status of knowledge on hepatitis B among the residents in Qingdao and provided a reference for improving relevant public awareness strategies.

Methodology: This cross-sectional study was conducted by an online questionnaire on the WeChat platform. Chi-square test was used to compare the hepatitis B influencing factors between subgroups. Binary logistic regression was used for multiple factor analysis to explore the influencing factors.

Results: The total awareness rate of hepatitis B was 79.6% among the 3261 qualified online questionnaires. Logistic regression showed that females (OR = 1.843, 95% CI: 1.547– 2.196), aged between 51 and 60 (OR = 2.323, 95% CI: 1.409–3.829), married (OR = 1.699, 95% CI: 1.335–2.162), and worked in government-affiliated departments were the influencing factors for the knowledge about hepatitis B.

Conclusions: The residents of Qingdao had incomplete knowledge about hepatitis B. Females, aged between 51 and 60, married, and those who worked in government-affiliated departments were found to have higher awareness rate than other subgroups. The government and related departments should pay more attention in educating the sub-groups that lack hepatitis B knowledge.

Key words: hepatitis B; knowledge; awareness; factor.

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Introduction

Hepatitis B virus (HBV) infection can cause chronic liver inflammation and multiple organ function damage, and is the leading cause of liver cirrhosis and primary liver cancer [1]. Approximately 250 million people worldwide experience HBV chronic infection and estimates show that 1 million people die annually. Most HBV deaths occur from liver cirrhosis and hepatocellular carcinoma [2]. China is one of the countries recognized by the World Health Organization (WHO) with a high incidence of hepatitis B, and the estimated number of chronic HBV cases is 86 million people [3]. This condition causes a heavy economic burden for the patients and the society.

Lack of knowledge may influence attitudes [4], and the right attitude is important for compliance with infection control measures [5]. Some studies have shown that the lack of knowledge about hepatitis B is a barrier to HBV prevention and treatment [6]. Thus, the awareness level of hepatitis B among residents must be determined when formulating relevant policies. In China, recent studies focused on pregnant women [7], medical workers [8], migrant workers [9], and other specific populations. There is lack of research among the general community residents, and the hepatitis B awareness level among Qingdao residents is still unknown. So, we conducted a cross-sectional study of Qingdao residents. This study aims to assess the awareness of HBV among residents in Qingdao and provide a basis for formulating relevant policies.

Methodology

Study design

This study was conducted from July to October 2020 in Qingdao. The cross-sectional study was conducted by an online questionnaire on the WeChat platform. The online questionnaire was distributed through the WeChat public account developed by the Qingdao Center for Disease Control and Prevention. IP addresses were restricted so that each respondent could only complete one questionnaire.

Study population and sample size

Qingdao residents who were over 20 years old were included in the study. This study used convenience sampling, and the sample size was determined by using the formula for the cross-sectional survey: $N = Z^2_{1-\alpha}p(1-p)/d^2$, where N is the number of respondents, Z

is the standard normal distribution value at 95% CI, which is 1.96, p is the predicted awareness rate of hepatitis B among residents (40%, according to previous research) [10], and d is the allowable error, which was set to 0.03. Accordingly, the required sample size was 1025.

Knowledge responses

The contents of the questionnaire had 16 items that were grouped under two sections. The first section was related to the participants' demographic factors (8 items), such as age, gender, occupation, and monthly income. The second section involved 8 questions about hepatitis B, including the source of infection, the route of transmission, the susceptible population, and other questions. The responses to the second section were measured (8 items, one point each), and the scores ranged from 0 to 8. The correct response rates for each question were calculated as awareness rates. And the correct response rates for all questions were calculated as total awareness rate. We divided the respondents into two groups, namely, "awareness group" and "not awareness group" based on a 75% cut-off point, as reported in another study (i.e., ≥ 6 points for the awareness group, and ≤ 5 points for the not awareness group) [11].

Table 1. Demographic characteristics of the respondents.

Variables	n (%)
Gender	
Male	1199 (36.77)
Female	2062 (63.23)
Age (years)	
20–30	781 (23.96)
31–40	1567 (48.05)
41–40	646 (19.81)
51–60	187 (5.73)
61 and above	80 (2.45)
Ethnicity	
Han ethnic group	3160 (96.90)
Others	101 (3.10)
Marital status	
Married	2773 (85.04)
Single	488 (14.96)
Inhabitancy	
City	2410 (73.90)
Countryside	851 (26.10)
Education	
Primary school	34 (1.04)
Junior high school	242 (7.42)
Senior high school or Technical secondary school	678 (20.80)
Associate college	932 (28.58)
College	1114 (34.16)
Master's degree and above	261 (8.00)
Occupation	
Self-employed	278 (8.52)
Worker	462 (14.17)
Company employee	761 (23.34)
Government-affiliated department	950 (29.13)
Farmer	145 (4.45)
Retired	144 (4.41)
Others	521 (15.98)
Monthly income (RMB)	
< 2000	523 (16.04)
2000~	1561 (47.87)
5000~	786 (24.10)
> 10,000	391 (11.99)
Family members infected with hepatitis B	
Yes	337 (10.33)
No	2924 (89.67)

RMB, Renmin Bi Yuan, is the legal currency of China.

Ethical considerations and confidentiality

This online survey was anonymous and confidentiality of all submitted questionnaires was guaranteed by the online survey website. All participants voluntarily took part in the study. Ethics approval was obtained from the Qingdao Center for Disease Control and Prevention Ethics Review Committee.

Statistical analysis

The questionnaire data were imported into Excel, and logic check was used to establish a database. The data were analyzed on SPSS (Statistical Package for the Social Sciences) version 17. Descriptive analyses were used for the demographic factors. Chi-square analysis was used for pairwise comparison between subgroups. Logistic regression was used to analyze the influencing factors of participants' awareness of hepatitis by calculating 95% CIs. *p* values of less than 0.05 were considered statistically significant.

Results

Demographic characteristics

A total of 3261 qualified questionnaires were collected. Among the respondents, 1199 (48.05%) were male, and 2062 (51.95%) were female. Majority of the participants (1567, 48.05%) belonged to 31–40 years age group. A total of 3160 (96.90%) participants belonged to the Han ethnic group and 101 (3.10%) belonged to the other ethnic group. Most participants lived in the city (2410, 73.90%). A total of 1114 (34.16%) participants attained undergraduate education. Among the participants, 2773 (85.04%) were married, and 1561 (47.87%) claimed to earn 2000 to 4999 RMB per month. Most participants worked in government-affiliated departments (950, 29.13%), and 336 (10.33%) participants claimed that their family members were infected with hepatitis B (Table 1).

Table 2. Participants' knowledge regarding hepatitis B (n = 3261).

Items	Awareness number (%)
What is the source of infection for hepatitis B?	2934 (89.97)
What is the main transmission route of hepatitis B?	2791 (85.89)
What is the susceptible population of hepatitis B?	3261 (100)
What method could prevent hepatitis B infection?	2519 (65.04)
What is the number of vaccinations for hepatitis B?	2616 (80.22)
What is the applicable population of hepatitis vaccine?	2652 (81.32)
What is the disease process of hepatitis B?	2527 (77.49)
What is the main symptom of acute hepatitis B?	1858 (56.98)

Table 3. Univariate analysis of hepatitis B influencing factors.

Variables	Awareness group (%)	Non-awareness group (%)	*p* value
Gender			**< 0.001***
Male	821 (68.47)	378 (31.53)	
Female	1653 (80.16)	409 (19.84)	
Age (years)			**< 0.001***
20–30	549 (70.29)	232(29.71)	
31–40	1199 (76.52)	368 (23.48)	
41–50	505 (78.17)	141 (21.83)	
51–60	163 (87.17)	24 (12.83)	
61 and above	58 (72.50)	22 (27.50)	
Ethnicity			**< 0.001***
Han ethnic group	2416 (76.46)	744 (23.54)	
Others	58 (57.43)	43 (42.57)	
Marital status			**< 0.001***
Single	306 (62.70)	182 (37.30)	
Married	2168 (78.18)	605 (21.82)	
Inhabitancy			**< 0.001***
City	1863 (77.30)	547 (22.70)	
Countryside	611 (71.80)	240 (28.20)	
Education			**0.008***
Primary school	23 (67.65)	11 (32.35)	
Junior high school	177 (73.14)	65 (26.86)	
Senior high school / Technical secondary school	519 (76.55)	159 (23.45)	
Associate college	673 (72.21)	259 (27.79)	
College	881 (79.08)	233 (20.92)	
Master's degree and above	201 (77.01)	60 (22.99)	
Occupation			**< 0.001***
Retired	111 (77.08)	33 (22.91)	
Worker	329 (71.21)	133 (28.78)	
Farmer	109 (75.17)	36 (24.83)	
Self-employed	188 (67.63)	90 (32.37)	
Company employee	552 (72.54)	209 (27.46)	
Government-affiliated department	795 (83.68)	155 (16.32)	
Others	390 (74.86)	131 (25.14)	
Monthly income (RMB)			**0.002***
< 2000	393 (75.14)	130 (24.86)	
2000~	1147 (73.48)	414 (26.52)	
5000~	615 (78.24)	171 (21.76)	
> 10000	319 (81.59)	72 (18.41)	
Family members infected with hepatitis B			**0.263**
Yes	264 (78.34)	73 (21.66)	
No	2210 (75.58)	714 (24.42)	

*Statistically significant ($p < 0.05$).

Hepatitis B knowledge

The total awareness rate among the 3261 participants was 79.58%. The awareness rate of a single item was between 56.98% and 100%. Specifically, the awareness rates were: 100% for susceptible population, 89.97% for the source of infection, 85.59% for the route of transmission, 81.32% for the applicable population of hepatitis B vaccine, 80.22% for the number of vaccinations of hepatitis B, 77.49% for the disease process, 65.04% for the prevention measures, and 56.98% for the acute symptoms (Table 2).

Univariate analysis of hepatitis B influencing factors

There were background differences between the two groups. Their gender (p<0.001), age (p<0.001), ethnicity (p<0.001), marital status (p<0.001), inhabitancy (p<0.001), education (p=0.008), occupation (p<0.001), and monthly income (p= 0.002) were statistically significant. Women had more knowledge than men. The Han ethnic group had more knowledge than the others. The participants who were married had more knowledge than those who were single. The participants who lived in the city had more knowledge than those who lived in the countryside. The participants who were 51–60 years old, had a college education, worked in a government-affiliated department, and had a monthly income of over 10000 RMB had more knowledge (Table 3).

Multivariate analysis of hepatitis B influencing factors

The statistically significant factors in the univariate analysis were used as independent variables for

Table 4. Bivariate logistic regression analysis of the hepatitis B influencing factors.

Variables	B	S.E.	Wald	*p*	OR	95% CI
Gender						
Male					1	
Female	0.612	0.089	46.942	< 0.001*	1.843	1.547–2.196
Age (years)						
20–30					1	
31–40	0.149	0.115	1.674	0.196	1.161	0.926–1.454
41–50	0.208	0.145	2.068	0.150	1.231	0.927–1.635
51–60	0.843	0.255	10.918	0.001*	2.323	1.409–3.829
61 and above	0.169	0.312	0.293	0.588	1.184	0.643–2.181
Ethnicity						
Han ethnic group					1	
Others	−0.723	0.222	10.593	0.001*	0.485	0.314–0.750
Marital status						
Single					1	
Married	0.530	0.123	18.540	< 0.001*	1.699	1.335–2.162
Inhabitancy						
City					1	
Countryside	−0.154	0.102	2.262	0.133	0.858	0.702–1.048
Education						
Primary school					1	
Junior high school	0.365	0.411	0.787	0.375	1.441	0.643–3.226
Senior high school or technical secondary school	0.570	0.411	1.918	0.166	1.768	0.789–3.960
Associate college	0.282	0.429	0.433	0.511	1.326	0.572–3.071
College	0.514	0.447	1.321	0.250	1.672	0.696–4.020
Master's degree and above	0.199	0.536	0.137	0.711	1.220	0.426–3.490
Occupation						
Retired					1	
Worker	0.047	0.271	0.031	0.861	1.049	0.617–1.782
Farmer	0.210	0.316	0.443	0.506	1.234	0.664–2.291
Self-employed	−0.073	0.280	0.067	0.795	0.930	0.537–1.611
Company employee	0.063	0.264	0.058	0.810	1.066	0.635–1.787
Government-affiliated department	0.588	0.266	4.876	0.027*	1.801	1.068–3.036
Others	0.130	0.258	0.254	0.614	1.139	0.687–1.889
Monthly income						
< 2000					1	
2000~	0.032	0.200	0.026	0.872	1.033	0.698–1.529
5000~	−0.037	0.264	0.019	0.889	0.964	0.574–1.618
> 10000	0.308	0.363	0.718	0.397	1.361	0.667–2.773

*Statistically significant (p < 0.05); S.E.: Standard Error; OR: Odds ratio; 95% CI: 95% Confidence Interval.

multivariate analysis of logistic regression. The participants' knowledge condition was used as the dependent variable (0 = "knowledgeable," 1 = "not knowledgeable").

Multivariate analysis showed that gender, age, ethnicity, marital status, and occupation can affect the participants' knowledge. Women who were aged between 51–60 years, belonged to the Han ethnic group, married, and worked in government-affiliated departments were the predictive factors of awareness (Table 4).

Discussion

Hepatitis B is a viral infection that causes inflammation of the liver, which can lead to liver cirrhosis, liver failure, and hepatocellular carcinoma [12]. Hepatitis B vaccination is one of the most effective methods to prevent HBV infection. Studies have shown that people with low awareness of hepatitis B tend to reject the vaccination against hepatitis B [13]. Therefore, the awareness rate of residents must be determined to control the hepatitis B infection in Qingdao.

This study aimed to describe the awareness of hepatitis B among Qingdao residents. The results indicated that the total awareness rate of Qingdao residents is 79.6%, which conforms to the requirements of the "China Viral Hepatitis Prevention and Control Program" that the residents' awareness rate of hepatitis B should reach 50% [14]. Compared with another study, our study area has a higher total awareness rate, which may be caused by the different demographic characteristics, the different definitions of awareness, and the different questionnaire items. Our study showed that Qingdao residents have more knowledge of the source of infection, the route of transmission, and the susceptible population. However, the participants lack knowledge of prevention measures and related items. This phenomenon has also been reported by another study [15]. The residents have knowledge of hepatitis B but are mostly limited to the theoretical level. The residents have low awareness of prevention measures and hepatitis B vaccination. Another study has shown that people may not be willing to take prevention measures due to a variety of reasons, such as financial limitations and distrust of the vaccine's effectiveness or safety [16]. Thus, residents may not be interested in hepatitis B prevention-related knowledge and have a low awareness rate [17]. We found that Qingdao residents have a low awareness rate of hepatitis B acute symptoms and that they mistake chronic symptoms for acute symptoms. A study has shown that more chronic hepatitis B cases are found than acute cases in China, which may cause the residents to spend more spare time learning about chronic infection. However, acute HBV infection can cause severe liver damage and should not be ignored. Consequently, future hepatitis B education should focus on the prevention of hepatitis B and the characteristics of acute HBV infection.

Our study shows that the residents' gender, age, ethnicity, marital status, and occupation are associated with the awareness rate. Women and Han ethnic people tend to have a high awareness rate, which may be caused by the differences in the social environment. A study has reported that in China, women may experience more discrimination associated with HBV than men [18]. So, they may learn more about hepatitis B to avoid this discrimination. In addition, a study has reported that many ethnic minorities such as the Miao ethnic group believed that childbirth is a natural practice which did not require any formal medical care [19]. This may prevent non-Han women from accessing medical care and reduce the chance of being educated by medical workers. The elder people tend to have low awareness of hepatitis, which is consistent with previous research [20]. This finding may be because elder people usually have a bad memory and take care of their children rather than their own selves, which is common in China. In our study, married residents have higher awareness than single people. This finding may be because married people in China receive pre-marriage screening and obtain knowledge from medical workers in this process [21]. Our study also shows that the participants who worked in government-affiliated departments have more knowledge than others. This finding may be because most hospitals in China are government-affiliated departments. Thus, many medical workers selected this option, and a previous study showed that medical workers have more hepatitis B relevant knowledge than other people [22]. Women, Han ethnic people, younger individuals, married, and worked in government-affiliated departments had more hepatitis B knowledge, and hepatitis B education is required for the low awareness population.

Our study has several limitations. The structural validity and internal validity of the questions in the questionnaire are not proven. The probability of selection bias is high because voluntary sampling through online surveys was performed rather than random sampling, due to which the results may not be generalized for all residents. Our study lacks the investigation of the hepatitis B relevant attitude and practice, and further research should be conducted.

Conclusions

This study shows that Qingdao residents had a moderate awareness rate of hepatitis B but lacked knowledge about the prevention measures and symptoms of hepatitis B. Therefore, hepatitis B education should be further strengthened. Government and relevant departments should focus on the promotion and education of the population who lack hepatitis B knowledge. A more targeted health education should be organized to improve the awareness rate among the residents.

References

1. Le MH, Yeo YH, Cheung R, Henry L, Lok AS, Nguyen MH (2020) Chronic hepatitis B prevalence among foreign‐born and U.S.‐born adults in the United States, 1999‐2016. Hepatology 71: 431-443. doi: 10.1002/hep.30831.
2. Hongjaisee S, Khamduang W, Sripan P, Choyrum S, Thepbundit V, Ngo-Giang-Huong N, Tangmunkongvorakul A (2020) Prevalence and factors associated with hepatitis B and D virus infections among migrant sex workers in Chiangmai, Thailand: a cross-sectional study in 2019. Int J Infect Dis 100: 247-254. doi: 10.1016/j.ijid.2020.09.004.
3. Razavi-Shearer D, Gamkrelidze I, Nguyen MH, Chen D-S, Van Damme P, Abbas Z, Abdulla M, Abou Rached A, Adda D, Aho I, Akarca U, Hasan F, Al Lawati F, Al Naamani K, Al-Ashgar HI, Alavian SM, Alawadhi S, Albillos A, Al-Busafi SA, Aleman S, Alfaleh FZ, Aljumah AA, Anand AC, Anh NT, Arends JE, Arkkila P, Athanasakis K, Bane A, Ben-Ari Z, Berg T, Bizri AR, Blach S, Brandão Mello CE, Brandon SM, Bright B, Bruggmann P, Brunetto M, Buti M, Chan HLY, Chaudhry A, Chien R-N, Choi MS, Christensen PB, Chuang W-L, Chulanov V, Clausen MR, Colombo M, Cornberg M, Cowie B, Craxi A, Croes EA, Cuellar DA, Cunningham C, Desalegn H, Drazilova S, Duberg A-S, Egeonu SS, El-Sayed MH, Estes C, Falconer K, Ferraz MLG, Ferreira PR, Flisiak R, Frankova S, Gaeta GB, García-Samaniego J, Genov J, Gerstoft J, Goldis A, Gountas I, Gray R, Guimarães Pessôa M, Hajarizadeh B, Hatzakis A, Hézode C, Himatt SM, Hoepelman A, Hrstic I, Hui Y-TT, Husa P, Jahis R, Janjua NZ, Jarčuška P, Jaroszewicz J, Kaymakoglu S, Kershenobich D, Kondili LA, Konysbekova A, Krajden M, Kristian P, Laleman W, Lao WC, Layden J, Lazarus JV, Lee M-H, Liakina V, Lim Y-SS, Loo CK, Lukšić B, Malekzadeh R, Malu AO, Mamatkulov A, Manns M, Marinho RT, Maticic M, Mauss S, Memon MS, Mendes Correa MC, Mendez-Sanchez N, Merat S, Metwally AM, Mohamed R, Mokhbat JE, Moreno C, Mossong J, Mourad FH, Müllhaupt B, Murphy K, Musabaev E, Nawaz A, Nde HM, Negro F, Nersesov A, Nguyen VTT, Njouom R, Ntagirabiri R, Nurmatov Z, Obekpa S, Ocama P, Oguche S, Omede O, Omuemu C, Opare-Sem O, Opio CK, Örmeci N, Papatheodoridis G, Pasini K, Pimenov N, Poustchi H, Quang TD, Qureshi H, Ramji A, Razavi-Shearer K, Redae B, Reesink HW, Rios CY, Rjaskova G, Robbins S, Roberts LR, Roberts SK, Ryder SD, Safadi R, Sagalova O, Salupere R, Sanai FM, Sanchez-Avila JF, Saraswat V, Sarrazin C, Schmelzer JD, Schréter I, Scott J, Seguin-Devaux C, Shah SR, Sharara AI, Sharma M, Shiha GE, Shin T, Sievert W, Sperl J, Stärkel P, Stedman C, Sypsa V, Tacke F, Tan SS, Tanaka J, Tomasiewicz K, Urbanek P, van der Meer AJ, Van Vlierberghe H, Vella S, Vince A, Waheed Y, Waked I, Walsh N, Weis N, Wong VW, Woodring J, Yaghi C, Yang H-I, Yang C-L, Yesmembetov K, Yosry A, Yuen M-F, Yusuf MAM, Zeuzem S, Razavi H (2018) Global prevalence, treatment, and prevention of hepatitis B virus infection in 2016: a modelling study. Lancet Gastroenterol Hepatol 3: 383-403. doi: 10.1016/S2468-1253(18)30056-6.
4. Gebrecherkos T, Girmay G, Lemma M, Negash M (2020) Knowledge, attitude, and practice towards hepatitis B virus among pregnant women attending antenatal care at the University of Gondar comprehensive specialized hospital, Northwest Ethiopia. Int J Hepatol 2020: 1-10. doi: 10.1155/2020/5617603.
5. Singh A (2011) Knowledge, attitudes, and practice regarding infection control measures among dental students in central India. J Dent Educ 75: 7. doi: 10.1002/j.0022-0337.2011.75.3.tb05055.x.
6. Jones P, Soler J, Solle NS, Martin P, Kobetz E (2020) A mixed-methods approach to understanding perceptions of hepatitis B and hepatocellular carcinoma among ethnically diverse black communities in South Florida. Cancer Causes Control 31: 1079-1091. doi: 10.1007/s10552-020-01345-6.
7. Cheung KW, Seto MTY, Tsui PM, So PL, Wong D, Kong CW, Wang W, Ng EHY (2021) Knowledge, perception and expectation of management of hepatitis B infection among pregnant hepatitis B carriers in Hong Kong. J Viral Hepat 28: 1699-1709. doi: 10.1111/jvh.13609.
8. Hu Y, Dai X, Zhou Y-H, Yang H (2013) A knowledge survey of obstetrics and gynecology staff on the prevention of mother-to-child transmission of hepatitis B virus. J Infect Dev Ctries 7: 391-397. doi: 10.3855/jidc.2915.
9. Yang Y, Yan M, Yue M, Wang X, Zhang W, Li J, Li S (2015) Prevalence of hepatitis B and knowledge about hepatitis B among migrant workers in Shandong province, China: a cross-sectional study. Iran Red Crescent Med J 17: e26725. doi: 10.5812/ircmj.17(4)2015.26725.
10. Li T, Wang R, Zhao Y, Su S, Zeng H Public awareness and influencing factors regarding hepatitis B and hepatitis C in Chongqing municipality and Chengdu City, China: a cross--sectional study with community residents. BMJ Open 11: e045630. doi: 10.1136/bmjopen-2020-045630.
11. Rajamoorthy Y, Taib NM, Munusamy S, Anwar S, Wagner AL, Mudatsir M, Müller R, Kuch U, Groneberg DA, Harapan H, Khin AA (2019) Knowledge and awareness of hepatitis B among households in Malaysia: a community-based cross-sectional survey. BMC Public Health 19: 47. doi: 10.1186/s12889-018-6375-8.
12. Nguyen MH, Wong G, Gane E, Kao J-H, Dusheiko G (2020) Hepatitis B virus: advances in prevention, diagnosis, and therapy. Clin Microbiol Rev 33: 38. doi: 10.1128/CMR.00046-19.
13. Mutyoba JN, Surkan PJ, Makumbi F, Aizire J, Kirk GD, Ocama P, Atuyambe LM (2021) Hepatitis B birth dose vaccination for newborns in Uganda: a qualitative inquiry on pregnant women's perceptions, barriers and preferences. J Virus Erad 7: 100039. doi: 10.1016/j.jve.2021.100039.
14. National Health and Family Planning Commission, National Development and Reform Commission, Ministry of Education, Ministry of Science and Technology, Ministry of Industry and Information Technology, Ministry of Public Security (2018) Action plan for the prevention and treatment of viral hepatitis in China (2017-2020). Chin J Viral Dis 8: 1-5.

15. Eni AO, Soluade MG, Oshamika OO, Efekemo OP, Igwe TT, Onile-ere OA (2019) Knowledge and awareness of hepatitis B virus infection in Nigeria. Ann Glob Health 85: 56. doi: 10.5334/aogh.33.
16. Xiang H, Tang X, Xiao M, Gan L, Chu K, Li S, Tian Y, Lei X (2019) Study on status and willingness towards hepatitis B vaccination among migrant workers in Chongqing, China: a cross-Sectional study. Int J Environ Res Public Health 16: 4046. doi: 10.3390/ijerph16204046.
17. Miao N, Zheng H, Sun X, Shen L, Wang F, Cui F, Yin Z, Zhang G, Wang F (2019) Enhanced sentinel surveillance for hepatitis B infection in 200 counties in China, 2013-2016. PloS One 14: e0215580. doi: 10.1371/journal.pone.0215580.
18. Yu L, Wang J, Zhu D, Leng A, Wangen KR (2016) Hepatitis B-related knowledge and vaccination in association with discrimination against Hepatitis B in rural China. Hum Vaccines Immunother 12: 70-76. doi: 10.1080/21645515.2015.1069932.
19. Moore SJ, Min X, Hill N, Jones C, Zaixing Z, Cameron MM (2008) Border malaria in China: knowledge and use of personal protection by minority populations and implications for malaria control: a questionnaire-based survey. BMC Public Health 8: 344. doi: 10.1186/1471-2458-8-344.
20. Zheng J, Li Q, Wang J, Zhang G, Wangen KR (2017) Inequality in the hepatitis B awareness level in rural residents from 7 provinces in China. Hum Vaccines Immunother 13: 1005-1013. doi: 10.1080/21645515.2016.1265714.
21. Alharbi IM, Aljarallah BM (2018) Premarital hepatitis screening: attitude towards screening and the risk factors for transmission. Saudi Med J 39: 1179-1185. doi: 10.15537/smj.2018.12.23495.
22. Dehghani B, Dehghani A, Sarvari J (2020) Knowledge and awareness regarding hepatitis B, hepatitis C, and human immunodeficiency viruses among college students: a report from Iran. Int Q Community Health Educ 41: 15–23. DOI: 10.1177/0272684X19896727

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