



BMJ Open Psychological stress; knowledge, attitude and practice and acceptance of antiviral therapy in pregnant women with hepatitis B in Zhejiang, China: a case comparison study

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ABSTRACT

Objectives To determine knowledge, attitude and practice (KAP) and antiviral therapy's acceptance during pregnancy of pregnant women with hepatitis B and influencing factors.

Design Case-comparison study.

Setting The study was conducted in Zhejiang province, China, from September 2019 to December 2020.

Participants Pregnant and postpartum women with chronic hepatitis B.

Primary and secondary outcome measures The stress scores, self-assessed health score, KAP, antiviral therapy's acceptance rate during pregnancy and influencing factors were analysed. The Perceived Stress Scale-10 was used to assess stress. Logistic regression was used to analyse influencing factors on antiviral therapy.

Results The self-assessed health score of pregnant women without liver diseases (82.4 ± 9.3) was significantly higher than that of pregnant women with chronic hepatitis B (75.5 ± 9.5) and postpartum (75.1 ± 14.1). Psychological stress of pregnant women with chronic hepatitis B was significantly high with a 14.9 ± 3.6 score, but there was no significant difference between hepatitis B postpartum and non-liver disease women (12.7 ± 3.5 vs 12.9 ± 3.5 , $p=0.75$). The acceptance rate of pregnant women with hepatitis B for antiviral therapy was 84.2%, while that of postpartum women was even higher. Logistic regression analysis showed that patients with positive hepatitis B e antigen (HBeAg) (OR, 3.35; 95% CI, 1.21 to 9.26) and higher scores on hepatitis B-related knowledge (OR, 3.52, 95% CI, 2.18 to 5.69) were more likely to accept antiviral therapy during pregnancy.

Conclusions Pregnant women with hepatitis B in Zhejiang have heavy psychological stress and a high antiviral therapy acceptance rate during pregnancy. Acceptance is related to HBeAg status and level of understanding of hepatitis B during pregnancy. It is necessary to provide education on hepatitis B to reduce psychological stress and increase acceptance of antiviral therapy during pregnancy.

INTRODUCTION

In 2017, the WHO reported that the hepatitis B virus (HBV) is still a major threat to human

Strengths and limitations of this study

- This manuscript included a case comparison study in pregnant women with hepatitis B from multiple centres in Zhejiang.
- This study comprehensively analysed the data of pregnant women with different conditions to ensure the accuracy of the conclusions.
- The psychological status and treatment willingness of pregnant women with hepatitis B are unknown before this study.
- The sample size of the study should be expanded in subsequent studies.
- Because of the limitations of the research site, related studies should be conducted in more regions of China.

health. To solve the health and economic losses caused by HBV as much as possible, the WHO put forward the slogan of 'eliminate hepatitis B' by 2030, one of which is to reduce the infection rate among children to 0.1%.¹

In China, the widespread active and passive immunisation of newborns born to HBV carrier mothers have been implemented, that is, the first dose of hepatitis B vaccine and hepatitis B immunoglobulin is injected at birth, the second and third dose of vaccine is vaccinated at age of 1 month and 6 months, respectively, which reduced the rate of chronic HBV infection among children under the age of 5 years to 0.32%.² However, there is still a risk of immune failure in newborns born to women with HBV infection, and studies have shown that the risk of immune failure is positively correlated with the mother's hepatitis B viral load.³⁻⁵ The use of antiviral therapy during pregnancy is the most effective intervention to reduce the risk of mother-to-child transmission (MTCT) of

HBV and the prevalence of hepatitis B surface antigen (HbsAg) in children.⁶ The guidelines^{7–9} recommend that when pregnant women have HBV–DNA viral load $\geq 2 \times 10^5$ IU/mL, antiviral therapy from 24 to 28 weeks of gestation to postpartum should be considered. This short-term therapy can greatly reduce the hepatitis B viral load of pregnant women during delivery, thereby reducing the risk of MTCT. Anti-HBV drugs have been used in pregnant women for many years, and the safety of mothers and babies is worthy of recognition.^{10–11} Recent clinical studies of tenofovir disoproxil used in anti-HBV treatment among pregnant women have shown that use of the drug during pregnancy has no obvious impact on the liver function of pregnant women and the short-term development of newborns.^{12–13} However, pregnant women's knowledge, attitude and practice (KAP) and acceptance of antiviral therapy during pregnancy are unknown, and the reasons for treatment acceptance are complex, including the condition itself or awareness of hepatitis B disease, which may have a certain impact on antiviral therapy acceptance during pregnancy, and further investigation is needed.

Conversely, China launched a comprehensive prevention and treatment project for AIDS, syphilis and hepatitis B in 2010,¹⁴ which requires pregnant women to undergo HBsAg screening. Therefore, pregnant women with hepatitis B will be informed of their infection during the screening programme. However, there is still widespread discrimination against individuals with HBV infection in China.^{15–16} Pregnant women may be under heavy psychological pressure with the risk of hepatitis B infection, and psychological stress may affect not only the health of mothers and babies but also the mothers' decision-making regarding childbearing and breast feeding. Under the current management circumstances, more attention is paid to reducing the spread of HBV, but the support for health and psychological concerns of hepatitis B-infected mothers is not perfect.

This study aimed to explore psychological stress, KAP and acceptance and influencing factors of pregnant women for the use of antiviral therapy to prevent MTCT of hepatitis B during pregnancy.

METHODS

Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of our study.

Sample

A case-comparison study combined with a face-to-face questionnaire survey was conducted in Zhejiang province, China, from September 2019 to December 2020. The following were the three groups of participants: pregnant women with hepatitis B group (group A), postpartum women with hepatitis B group (group B) and non-liver disease control group (group C). We included pregnant women or those who gave birth within 1 year of HBsAg positivity or who were clinically diagnosed with

chronic hepatitis B infection. People with HIV or hepatitis C virus infection and other liver diseases during pregnancy and those who are known to be allergic to anti-HBV drugs or cannot cooperate to complete the questionnaire were excluded. The non-liver disease group consisted of pregnant women without any clinically confirmed liver diseases. We calculated the sample size based on the difference in stress score (Perceived Stress Scale (PSS)), when $\alpha=0.05$ and $1-\beta=0.80$, according to previous studies.^{17–18} The preset average value of group A was 15, group C was 13, SD=5 and the proportion of enrolment entry was 1:1. The two groups need to enrol 100 individuals, and the required total sample size was 200.

Study design

A continuous enrolment method was used in this study. All eligible participants in the outpatient clinics were invited to complete a face-to-face questionnaire. Before being invited to answer the questionnaire, each patient was informed of the questionnaire's content, purpose, duration and personal privacy treatment. After obtaining consent, the questionnaire survey was started. The researchers were professionals in the field and could accurately convey the information of each item in the questionnaire. The patient's personal information was confirmed by the hospital system to avoid duplication of the study (see online supplemental appendices 1 and 2 for the content of the questionnaire). The content of the questionnaire included the general condition of the patient, information about the severity of hepatitis B infection, KAP on hepatitis B, acceptance of antiviral therapy during pregnancy, reasons for receiving or not receiving treatment and self-assessed health score. Information on hepatitis B was collected from the hospital system query or the test list provided by the patients, including liver function test within 2 months, hepatitis B viral load determination within 6 months and hepatitis B-related antigen–antibody test within 6 months. We set six knowledge questions related to hepatitis B during pregnancy, and the content is shown in online supplemental appendix 1, Part IV. The self-assessed health score is a measure of the patient's subjective health status at the time of the interview with a score of 0–100. It is a score based on the subjective feeling of the research object, patients will select a score from 0 to 100 that can represent their physical condition. The higher the score, the better the patient's self-perceived health.¹⁹ Moreover, to assess the degree of short-term stress of the research participants, this study introduced the PSS, which was developed by Cohen *et al*²⁰ and is one of the most widely used tools for measuring psychological stress. PSS does not focus on specific events but assesses the degree of unpredictability, uncontrollability or overload in participants' lives. The PSS used in this study was a 10-item version. In the survey of different populations, the internal consistency of Cronbach's α coefficient was 0.78–0.91, and the retest correlation coefficient was 0.55–0.85. This version has been proven to have good reliability and validity in

a large population of Chinese communities and patients with hepatitis B, and it can effectively assess the degree of recent psychological stress in subjects.^{18 21} Please refer to online supplemental appendix 3 for items on this scale.

Statistical analysis

After the accuracy of the entered data is checked by a dedicated person, it is converted into an analysable data form, that is, knowledge of hepatitis B during pregnancy and the PSS-10 were converted into scores. There are six items of hepatitis B knowledge during pregnancy, and the correct answer to each item was confirmed by two senior physicians in the liver disease department. If the answer is correct, it will be counted as 1 point, and if the answer is incorrect, it will be counted as 0 point. It will not be counted if the answer is unclear. Between 0 and 6 points, the higher the score, the better the patient's understanding of hepatitis B knowledge. There are a total of 10 items in the PSS-10, and each item is divided into five grades from 0 (never) to 4 (always); hence, the score of the scale is between 0 and 40 points. The higher the score, the greater the psychological stress of the patients. Statistical analysis was performed using SPSS V.24 software. Independent sample analysis of variance (normally distributed data and homogeneous variance) was used to analyse the differences in continuous variables, and the χ^2 test or Fisher's exact test was used to analyse categorical variables. We adopted a two-category multifactor logistic regression to analyse the factors influencing the acceptance of antiviral therapy in pregnant women with hepatitis B and the assignments are shown in online supplemental appendix 4. A p value<0.05 indicated a statistically significant difference.

RESULTS

General situation of the interviewees

A total of 177 pregnant women with hepatitis B, 46 postpartum women with hepatitis B and 231 pregnant women with non-liver diseases accepted the invitation to answer the questionnaire. The overall response rate was 98%. Online supplemental appendix 5 shows the patient recruitment flowchart. The general conditions of the three groups of study subjects are shown in table 1.

These three groups have certain differences in some factors and were analysed in the regression model to explore the influence of some factors on the acceptance of antiviral therapy during pregnancy.

Hepatitis B condition and ways to determine the disease in groups A and B

As shown in table 2, childhood or school physical examination is the most common method of determining the severity of hepatitis B infection in the two groups, accounting for >40% of patients in both groups, followed by pregnancy screening. Within 2 months of the interview, 10.8% of patients in group A and 17.8% of patients in group B had abnormal transaminase levels. Moreover, 65.0% of the patients surveyed in group A and 82.6% of patients in group B were hepatitis B e antigen (HBeAg) positive. The HBV DNA levels of the two groups measured within 6 months of the interview were 7.47 (0, 9.72) \log_{10} IU/mL and 7 (0, 10) \log_{10} IU/mL. Among the patients recruited from the liver disease department, advice from obstetricians is the most important reason for seeking liver disease consultation, accounting for 61.4% of patients in group A and 82.6% of patients in group B.

Table 1 Sample demographics

	Group A	Group B	Group C	P value
Age (years, mean±SD)	32.0±5	32.0±5	30.0±5	<0.01
Gestational age (weeks, mean±SD)	21.5±8.3	–	22.1±11.9	0.57
Annual income (US\$, mean±SD)	14538.8±7483.2	12819.1±8754.5	11568.5±6722.2	<0.01
Rate of current town address (n, %)	157 (88.7)	38 (82.6)	153 (66.2)	<0.01
Education level (n, %)				0.12
Elementary school and below	2 (1.1)	0	1 (0.4)	
Junior high school	35 (19.8)	8 (17.4)	23 (10.0)	
High school or technical school	32 (18.1)	6 (13.0)	46 (19.9)	
Junior college	44 (24.9)	16 (34.8)	62 (26.8)	
Undergraduate	56 (31.6)	16 (34.8)	93 (40.3)	
Postgraduate and above	4 (8.5)	0	6 (2.6)	
Proportion of housewives (n, %)	49 (27.7)	14 (30.4)	74 (32)	0.64
Pregnancy times (n, %)				<0.01
Once	73 (41.2)	27 (58.7)	129 (55.8)	
Twice or more	104 (58.8)	19 (41.3)	102 (44.2)	
Medicare participation rate (% , n)	92.0 (163)	93.5% (43)	95.7 (221)	0.31

Table 2 Hepatitis B condition and ways to determine the disease condition in groups A and B

	Group A	Group B	P value
Ways to determine the condition of hepatitis B (n, %)			0.20
Childhood or school physical examination	84 (47.5)	20 (43.4)	
Work physical examination	18 (10.2)	4 (8.7)	
Premarital check	8 (4.5)	4 (8.7)	
Pregnancy screening	39 (22)	14 (30.4)	
Self-check	10 (5.6)	4 (8.7)	
Others	18 (10.2)	0	
Rate of abnormal ALT (n, %)*	12 (10.8)	8 (17.8)	0.24
HBV DNA level (log ₁₀ IU/mL, median (range))	7.47 (0, 9.72)	7 (0, 10)	0.34
Positive HBeAg (n, %)	115 (65)	38 (82.6)	0.02
Ways to know the need to see a physician for HBV (n, %)			0.04
Obstetrician recommendations	97 (61.4)	38 (82.6)	
Information from relatives and friends	7 (4.4)	2 (4.3)	
Self-understanding	45 (28.5)	6 (13.0)	
Others	9 (5.7)	0	

*The ratio is the number of people with abnormal ALT in the number of people with the test result in each group. ALT, alanine aminotransferase; HBeAg, hepatitis B e antigen; HBV, hepatitis B virus.

Self-assessed health and psychological stress in the three groups

Scores are shown in [figure 1](#). The self-assessed health score of pregnant women in group C (82.4±9.3) was significantly

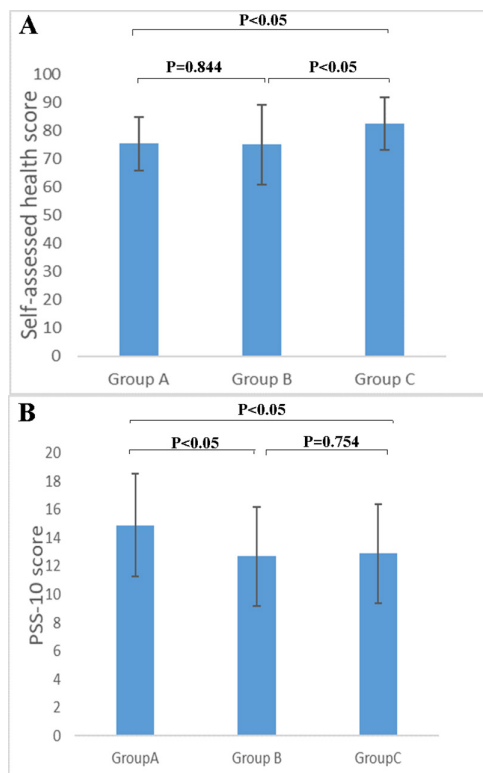


Figure 1 Self-assessed health and psychological stress in three groups. (A) Self-assessed health scores in three groups. (B) PSS-10 scores in three groups. PSS-10, Perceived Stress Scale.

better than that of women in groups A (75.5±9.5) and B (75.1±14.1). The PSS-10 evaluation showed that the psychological stress of group A was significantly higher within a short period during the interview, with a score of 14.9±3.6, but there was no significant difference in the psychological stress assessment between groups B and C (12.7±3.5 vs 12.9±3.5, p=0.75)

Survey on acceptance of treatment and KAP toward hepatitis B during pregnancy

[Table 3](#) shows the proportions of patients in the two groups who agreed with an item or answered 'yes'.

The acceptance rate of using antiviral drugs during pregnancy in group A was 84.2%, while the rate was even higher in group B (p<0.05). The physician's recommendation is the most important factor, accounting for 90.0% and 95.6% in the groups A and B, respectively. Among groups A and B, no cases were receiving antiviral therapy at the time of survey. Some pregnant women with hepatitis B, after being interviewed, started antiviral therapy during pregnancy on the advice of their physicians. However, the questionnaire was a one-time visit, we did not follow-up the patients' subsequent treatment, so how many people actually received treatment after being interviewed is unknown. Of the pregnant women who refused to use the drugs, 96.4% reported that they were worried about the safety of the fetus. In the hepatitis B knowledge survey, the scores of group A were lower than those of group B (3.8±1.4 vs 5.1±0.9, p<0.05), indicating that the patients after childbirth have a better understanding of hepatitis B during pregnancy than pregnant women. Patients from groups A and B, 63.8% and 54.3%, respectively, believed that their children would be infected with hepatitis B if

Table 3 Acceptance of antiviral therapy and KAP in groups A and B

	Group A	Group B	P value
Acceptance rate of antiviral therapy during pregnancy (% , n)	84.2 (149)	97.8 (45)	<0.01
Reasons for agreeing to take antiviral therapy (% , n)*			0.50
Doctor's recommendation	90.0 (134)	95.6 (43)	
Recommendations from family and friends	4.0 (6)	2.2 (1)	
Having a certain understanding of treatment methods	6.0 (9)	2.2 (1)	
Reasons for refusal to take antiviral therapy (% , n)†			
Concerns about fetal safety	96.4 (27)	—	
Concerns about own safety	10.7 (3)	100 (1)	
Family's disapproval	7.1 (2)	—	
Score of 6 hepatitis B questions (mean±SD)	3.5±1.3	5.1±0.9	0.00
Hepatitis B is contagious (% , n)	91.0 (161)	95.7 (44)	0.30
Hepatitis B can be transmitted to children through breast feeding (% , n)	63.8 (113)	54.3 (25)	0.24
Mothers with high HBV DNA levels are at higher risk of infecting their children (% , n)	89.3 (158)	89.1 (41)	0.90
Taking antiviral drugs during pregnancy can reduce your child's risk of infection (% , n)	83.1 (147)	95.7 (44)	0.03
Hepatitis B vaccination can completely prevent children from getting infected (% , n)	54.2 (96)	73.9 (34)	0.02
A blood test can tell if the child is infected with hepatitis B (% , n)	98.3 (174)	97.8 (45)	0.83
Attitude (% , n)			
All pregnant women should be tested for hepatitis B	96.0 (170)	95.7 (44)	0.90
Pregnant women with hepatitis B deserve more guidance about their condition	97.2 (172)	100.0 (46)	0.25
Practice (% , n)			
Choose caesarean section because of fear of spreading disease	20.3 (36)	6.5 (3)	0.03
Do not want to give birth again because of hepatitis B	26.6 (47)	39.1 (18)	0.09
Refusal to breastfeed	42.4 (75)	17.4 (8)	<0.01
Consulted about hepatitis B before pregnancy	53.7 (95)	41.3 (19)	0.14
Consulted about hepatitis B during pregnancy	82.5 (146)	97.8 (45)	<0.01
Received the doctor's guidance on HBV during pregnancy	87.0 (154)	100.0 (46)	0.01

*The denominator of the proportion is the number of group A or B who accepted antiviral therapy during pregnancy.

†The denominator of the proportion is the number of group A or B who refused antiviral therapy during pregnancy.

HBV, hepatitis B virus; KAP, knowledge, attitude and practice.

breast feeding is done, and 54.2% and 73.9%, respectively, believed that hepatitis B vaccination to their children could completely prevent hepatitis B infection and it is unnecessary to receive antiviral therapy. In terms of hepatitis B screening, 96.0% of patients in group A and 95.7% in group B believed that the implementation of the hepatitis B screening programme during pregnancy was necessary, and most of them thought that pregnant women with hepatitis B should receive more guidance on their condition during pregnancy. Regarding the attitude toward hepatitis B, 26.6% of pregnant women with hepatitis B reported that because of hepatitis B infection, they were unwilling to give birth again. This proportion is even higher among women in group B. In group C, the probability that pregnant women refused to give birth again was 22.7%. Although 42.4% patients in group A were unwilling to breastfeed their children because of concerns about infection transmission to the child, in group C, only 3.9% of women were unwilling

to breastfeed their children. Moreover, groups A and B showed obvious initiative in disease consultation.

Analysis of acceptance of antiviral therapy during pregnancy and its influencing factors

We have incorporated many factors into the univariate analysis (see online supplemental appendix 6) with the data of group A. The factors in the analysis included age, annual income, gestational week, PSS-10, HBeAg status, education level and basic understanding of hepatitis B. The results showed that the HBeAg status, annual income, gestational week and score of hepatitis B-related knowledge were influencing factors that affect whether a patient is willing to receive antiviral therapy during pregnancy. All factors were fitted to the multivariate logistic analysis, and the status of HBeAg and hepatitis B knowledge scores were entered into the model.

As shown in table 4, patients who are HBeAg positive are more likely to accept antiviral therapy during pregnancy

Table 4 Logistic regression analysis of influencing factors on acceptance of antiviral therapy during pregnancy

	B	SE	Wals	df	Sig.	Exp(B)	Exp(B) 95% CI	
							Lower	Upper
HBeAg	1.21	0.52	5.45	1	0.02	3.35	1.21	9.26
Hepatitis B knowledge score	1.26	0.24	26.56	1	0.00	3.52	2.18	5.69
Constant	-2.63	0.74	12.61	1	0.00	0.07		

B: coefficient; Exp(B): OR; Wals: χ^2 value; Sig., p value. df, degrees of freedom; HBeAg, hepatitis B e antigen.

than those who are HBeAg negative (OR (95% CI), 3.35 (1.21 to 9.25)), and patients with higher scores on hepatitis B-related knowledge were more likely to receive antiviral therapy during pregnancy (OR (95% CI), 3.52 (2.18 to 5.69)).

DISCUSSION

To minimise the risk of MTCT of hepatitis B caused by high viral load, the guidelines recommend that pregnant women with high viral load use antiviral drugs in the second and third trimesters to reduce the risk of MTCT. However, many pregnant women are sceptical about using medications during pregnancy, and factors such as understanding of hepatitis B disease, economic status, family beliefs and other factors may affect the probability that patients who should be treated will eventually receive treatment. In China, discrimination against patients with hepatitis B is extremely common,²² and hepatitis B infection may also affect the mental health of pregnant women.

Although China has implemented a plan to screen for HbsAg during pregnancy for more than 10 years, in this study, many patients were informed of their hepatitis B infection status as early as childhood or during school physical examination. Even so, pregnant women with hepatitis B still have insufficient knowledge about maternal and infant healthcare, suggesting that pregnant women with hepatitis B do not pay enough attention to the condition, which easily leads to patients missing the best treatment time. There are a few cases of abnormal liver function in pregnant women with hepatitis B in our study; therefore, we must not neglect the screening of pregnant women with hepatitis B and provide individualised diagnosis and treatment plans for their condition and supervise them to complete the treatment process. Popular science education for pregnant women with HBV also appears to be particularly important.

This study explored the acceptance of antiviral drug therapy during pregnancy in women with hepatitis B and its influencing factors and the impact of hepatitis B infection on the psychological stress of pregnant women. The results show that pregnant women with hepatitis B infection in Zhejiang have a good acceptance of antiviral drugs during pregnancy and more than 80.0% of them were willing to receive treatment during pregnancy. Compared

with other countries, the acceptance rate of treatment in Zhejiang is significantly higher. A study showed that only 15.0% of pregnant women with hepatitis B in Singapore are willing to accept antiviral treatment during pregnancy.²³ China's medical insurance gradually put tenofovir disoproxil for prevention of MTCT in the insurance reimbursement from 2020, but the efficiency of implementation is different in regions, and patients still need to pay part of the cost by themselves. In our study, HBeAg status and knowledge of hepatitis B played an important role in influencing pregnant women with hepatitis B to accept medication. HBeAg-positive pregnant women are more likely to accept antiviral treatment than HBeAg-negative pregnant women, probably because, in the perception of patients, HBeAg positive means a more serious condition and their willingness to receive treatment will be more positive, which, on the whole, is also affected by patients' understanding of hepatitis B. The content of the six questions about hepatitis B-related knowledge questions we have set covers the transmission route of hepatitis B, effectiveness of the vaccine's immunity to infants, influence of the level of the virus on the transmission and methods of treatment. The results of the study showed that the more pregnant women understand these contents, the more likely they are to receive antiviral treatment. These problems reflect that the resistance of pregnant women to not accepting medication during pregnancy comes from not knowing which conditions require treatment, not knowing the risk of high viral load and scepticism of treatment methods. This study shows that the most important reason for not accepting medication during pregnancy is worry about the safety of the drug to the fetus. A large number of studies have shown that the effectiveness and safety of tenofovir disoproxil and telbivudine for MTCT of hepatitis B are both certain,²⁴⁻²⁷ and we can infer that detailed hepatitis B-related knowledge education and medication science will increase the acceptance rate of pregnant women with hepatitis B for medication during pregnancy. The analysis of factors affecting the antiviral acceptance rate in this study also confirmed that patients with higher scores of hepatitis B-related knowledge during pregnancy are more likely to receive antiviral therapy during pregnancy.

In contrast, although China implemented a plan to screen for HBsAg during pregnancy in 2010, many

patients were informed of their hepatitis B infection status as early as childhood. The main purpose of the screening programme is to reduce the risk of MTCT; however, attention to the mother's psychology and follow-up treatment is insufficient. The self-assessed health status of pregnant women and postpartum women with hepatitis B is not as good as that of pregnant women with non-liver diseases, and pregnant women with hepatitis B commonly have greater psychological stress than postpartum women and pregnant women without liver diseases. Hepatitis B infection causes heavy psychological stress in pregnant women, which is a threat to the health of mothers and babies.²⁸ Moreover, hepatitis B infection affects women's decision-making regarding childbearing and breast feeding. Some mothers refuse breast milk because of their illness and refuse to give birth again. The guidelines recommend that after the baby has received active and passive hepatitis B immunisation after birth, breast milk can be given normally by HBV-infected mothers, which would not increase the risk of transmission.^{7,29} Moreover, we observed that in postpartum women with hepatitis B, the probability of refusing to breastfeed was lower than that of pregnant women with hepatitis B. As the perinatal period progresses, patients will have several opportunities to consult with their physicians and will also receive breastfeeding guidance during the process. Therefore, it is necessary to provide education and psychological counselling for pregnant women with hepatitis B, which can reduce the psychological stress of patients and improve their quality of life.

This study also has certain limitations. It was conducted in Zhejiang province, which is an economically developed region in China with relatively sufficient medical resources. Therefore, the medical resources and related management education obtained by pregnant women with hepatitis B in this region cannot represent the national level. A study has shown that only 16.5% of healthy pregnant women in the Guangdong region reported that they can accept antiviral drug therapy during pregnancy.³⁰ This also suggests that the acceptance rate of treatment during pregnancy varies significantly and the influencing factors are complex. More studies are needed to improve the management of pregnant women with hepatitis B. Moreover, in the exclusion criteria, we excluded patients who were known to be allergic to anti-HBV drugs, which may have an impact on the results. However, we did not encounter similar cases during our study, and a study³¹ has confirmed that the probability of allergy to anti-HBV drugs is low.

Further studies in other regions, such as central and western China, are necessary to explore the attitudes and understanding of pregnant women with hepatitis B in treatment during pregnancy under the background of different medical resources. Moreover, whether relevant knowledge education and psychological intervention for pregnant women with hepatitis B can improve their psychological stress and increase their acceptance of treatment during pregnancy also needs to be confirmed.

Conclusions

Pregnant women with hepatitis B in Zhejiang have heavy psychological pressure and good acceptance of antiviral therapy during pregnancy. Acceptance is related to the HBsAg status and level of understanding of hepatitis B during pregnancy. It is necessary to provide education on hepatitis B to reduce psychological stress and increase acceptance of antiviral therapy during pregnancy.

Contributors SY is responsible for the overall content as a guarantor. SY and LLI designed the study. XL, CC, DJ and DY collected data. XL, CC and YZ analysed data. CD, LLan and CH checked the data and results. XL and CC interpreted data and wrote the report. SY revised the report from preliminary draft to submission. All authors have read and approved the manuscript and are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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